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COMPUTERWORLD

INSIDE

COMPUTERWORLD BUYERS' SCORECARD

Bottleneck busters

In user ratings of MVS performance monitors, Omegamon users gave the product the highest score for isolating bottlenecks. However, The Monitor topped the overall ratings

See Buyers' Scorecard, page 90

Product	Score
Response base: 50 users per product	
Candle Corp.'s Omegamon	74.8
Landmark Systems Corp.'s The Monitor	73.9
Boole and Babbage, Inc.'s Resolve Plus	66.8
IBM's RMF Monitor 2	50.7

CW Chart: Doreen St. John

Competitive advantage fleeting

BY MICHAEL L. SULLIVAN-TRAINOR and JOSEPH MAGLITTA
CW STAFF

Is the notion of using information systems for competitive advantage dead?

No way, according to a recent poll of top IS executives in *Computerworld Premier 100* companies. But in today's business climate, respondents said, you're lucky to keep that advantage for more than 12 to 18 months.

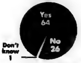
Overall, nearly three-quarters of IS executives in the *Premier 100*, the annual survey of top technology users, said their organizations have implemented information systems during the last year solely to get ahead of the competition. "Companies are leapfrogging each other," said Thomas Kiernan, president of AMR Corp.'s Sabre Computer Services Division. "Technology gives companies the ability to catch up promptly."

Competitive necessity

The vast majority of IS executives in Premier 100 companies implemented systems to attain competitive advantages

Q: Did your company install systems for competitive advantage in the last twelve months?

Number of respondents
Base: 91



CW Chart: Paul Mock

With higher hopes pinned to technology, it is no surprise that 53 of the *Premier 100* IS executives received increases in their 1990 IS budgets. Most banks, chemical companies and petroleum and financial services firms polled enjoyed budget increases: IS spending by banks and chemical companies rose 8%, financial services 7.5% and petroleum firms 5%, based on medians for the groups.

Firms in banking, financial services, manufacturing and aerospace were the biggest advocates of using technology for competitive gain. More than three-quarters of the companies in each of those groups said they implemented "strategic" systems during the past 12 months.

One notable shift among respondents concerned the focus of strategic systems. In the past, external or customer applications were presumed to be the best use of technology. Now, many say that the biggest

Continued on page 4

New VAXs to pack big power surge

Memory needs could cause sticker shock

BY MARYFRAN JOHNSON
CW STAFF

In a significant departure from previous upgrades within its VAX 6000 minicomputer line, Digital Equipment Corp. will announce new models during the week of Oct. 22 that will require 128M-byte memory boards and a revamped backplane to drive vastly improved performance.

DEC will also be busy later this month with a slew of announcements (see story page 8), including the Oct. 16 unveiling of a six-processor minicomputer based on Intel Corp.'s I486 chip and running The Santa Cruz Operation's SCO MPX Unix.

The VAX 6000 Model 500s, 40% to 50% more powerful than the present top-of-the-line minis, "will be sharply more expensive than previous upgrades," said Chris Christiansen, an analyst at Meta Group, Inc. in Westport, Conn.

They will also require the newest version of the operating system, VMS 5.4, several customers and analysts confirmed.

"This upgrade will require major changes. The [Model 500s] are nothing like the 6300s

Continued on page 8

Price tag hindering slow-burning Notes

BY PATRICIA KEEFE
CW STAFF

Lotus Development Corp. is still taking notes a year later when it comes to its most promising and most pricey offering, Notes — groupware communications software for creating and accessing shared information using personal computers and local- and wide-area networks.

With a few notable exceptions, such as Manufacturers Hanover Trust Corp., Reuters International and Price Waterhouse, that are actively cheerleading for the product, the bulk of the user community is taking its time studying Notes.

Lotus said 39 accounts have purchased Notes, but the firm said it expects to have 100 by year's end.

Regardless, users and analysts predicted sales might be higher if only Lotus would take a more flexible approach to packaging and price.

Some users claimed to suffer from sticker shock. The initial Notes investment is $62,500 per 200 users; volume discounts are available. "My management's attitude was that it was pretty steeply priced," said Brian Illari, vice-president at Citibank NA.

For other interested users, price is and is not an issue. On the one hand, IS managers are used to paying millions for mainframes and hundreds of thousands of dollars for related software.

But there is a cultural and political infrastructure that supports that kind of purchase, one unprecedented at the desktop. "The work group is traditionally headed up by an individual without the budget Lotus is asking

Continued on page 132

Lack of Unix unity blurs RISC future

BY J. A. SAVAGE
CW STAFF

Reduced instruction set computing systems in the 1980s have been rather like Japanese sports cars — fast, inexpensive and, from the exterior, often indistinguishable.

In the 1990s, RISC will be even faster and less expensive. RISC products will span the range from compact in the high-end personal computer range to Cadillac in the mainframe range. By the mid-1990s, several RISC engines will be tied together in one computer, revving the power up to that of next year's highest-end mainframes.

While all that price/performance is appealing, the promise of open systems — in which a user could pick an engine from one dealer, peripherals from another, interior from a third and make it all go — is still years away.

With one exception, all vendors' RISC architectures use a Unix operating system. But RISC vendors, despite all their lip service about open systems, cannot agree on one version of Unix. While they all said they will follow a standard whenever it is issued, most appear resistant to homogenization of their applications to make them portable across hardware, as they have sunk many engineering hours into tuning Unix for their particular RISC architecture.

For instance, Michael Mahon, manager of processor architectures at Hewlett-Packard Co., said that in the future, software will be developed neutral to the vendors' architecture and will be recompiled on-site to fit the particular

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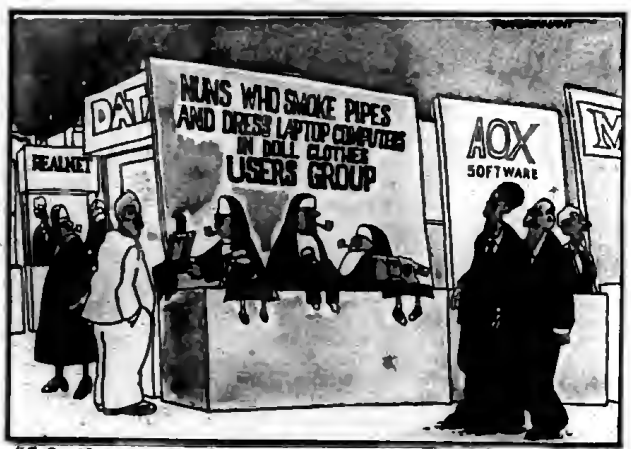
The Fifth Wave



"I GUESS THERE'S A 'USERS GROUP' FOR JUST ABOUT EVERYONE THESE DAYS."

EXECUTIVE BRIEFING

■ **Competitive advantage for IS** increasingly comes from re-engineering internal processes, say a majority of the 100 most effective users of IS. *Computerworld*'s third annual ranking of the *Premier 100* found that most companies still believe in strategic systems but are focusing on improving internal functions and empowering users. They also believe the window for competitive advantage is much more narrow than it used to be. **Page 1 and supplement.**

■ **The effectiveness of RISC architecture is hampered** by the lack of common Unix standards among vendors. Despite dazzling price/performance breakthroughs, systems administration hassles are a big problem for IS departments trying to make different versions of Unix consistent. IS hopes may rest on future software from Patriot Partners, the new IBM joint venture with Metaphor, to smooth out Unix differences. **Pages 1 and 131.**

■ **Sears' retail business was an IS pioneer** in its industry, but many of its leading-edge systems have grown old. IS chief Robert Ferkenhoff is attempting to spur a corporate turnaround with a reorganized department and revamped applications. **Page 67.**

■ **The federal government is about to move forward** on a $1.9 billion effort to develop a high-power, high-speed computer network. The plan has been stalled by differences between two rival Senate bills, but a compromise is reportedly at hand. **Page 8.**

■ **Unisys unveiled its architecture plans for the '90s,** exemplifying the fine line vendors are walking between open and proprietary systems. Meanwhile, Unisys stock fell after Moody's downgraded the firm's debt and preferred stock. **Page 6.**

■ **50-MHz PCs based on the Intel I486 chip** may appear as early as Comdex/Fall. Everex and three other vendors are expected to display systems running at 50 MHz. **Page 4.**

■ **CD-ROM applications still have a way to go** as mainstream business tools, attendees at CD-ROM Expo in Boston said. Too often, they added, applications are merely repackaged databases or books. **Page 10.**

■ **Short-term thinking in IS** is preventing many companies from moving ahead with strategic technologies such as migration to OSI. Long-term, hard-to-quantify benefits are a very tough sell to top management, especially in a time of recession threats and the Middle East crisis. **Page 59.**

■ **Performance management tools are becoming more popular** for analyzing resource-intensive applications, scheduling jobs efficiently and otherwise eking all the power out of current systems. Nonetheless, experts say most large firms are just now getting into true capacity management. **Page 81.**

■ **On-site this week:** A mainframe spreadsheet helps National Semiconductor coordinate manufacturing plans with sales results. **Page 45.** Cincinnati-based Gibson Greetings arms its account reps with PCs to give retailers information that can increase store sales. **Page 47.** The American Stock Exchange scraps fault-tolerant systems for lower-cost DEC platforms. **Page 31.** A DG-based on-line system monitors air quality for Connecticut's Department of Environmental Protection. **Page 34.** Lincoln National Insurance in Fort Wayne, Ind., gains office productivity with systems tailored to 70% of its workers — the mainstream users. **Page 38.** Community Memory in Berkeley, Calif., runs an electronic bulletin board for citizens to exchange information on terminals in public places — including bars and Laundromats. **Page 60.**

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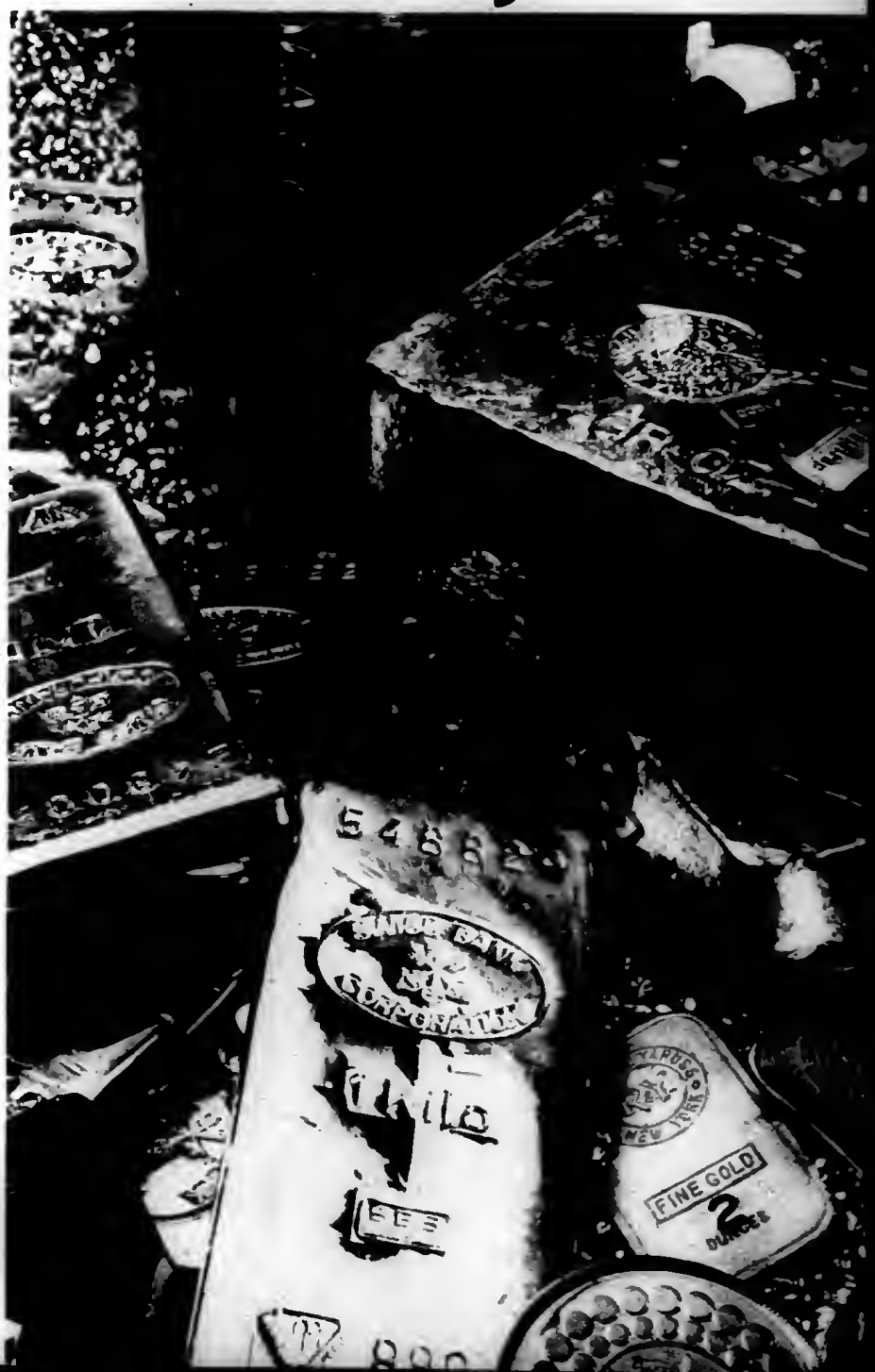

Everex set to show 50-MHz PC

BY MICHAEL FITZGERALD
CW STAFF

Even though Intel Corp.'s release of its 50-MHz 1486 chip will not come until sometime in 1991, power users may still find an 1486-based machine running at 50 MHz under the Christmas tree this year.

Everex Systems, Inc. is one of at least four hardware vendors that are expected to display an 1486-based machine running at 50 MHz at Comdex/Fall '90 in November, sources said. Sources inside Everex confirmed the report, although Everex had no official comment.

The speed increase comes from a technology twist called Icecap, or integrated circuit environmental control, made by Velox Computer Technology, Inc., a Santa Clara, Calif.-based start-up. Icecap uses solid-state technology to cool the chip down to zero degrees Celsius and keep it from overheating at the higher clock speeds.

Mel Snyder, president of Velox, confirmed that Everex has purchased several lots of Icecaps and said that other buyers include IBM, Intel, Digital Equipment Corp., Compaq Computer Corp., Dell Computer Corp. and Commodore Business Machines, Inc., as well as a number of systems integrators. He refused to confirm whether any of these vendors would display machines using Icecap at Comdex.

Snyder said he expects machines based on Icecap technology to make it to market before year's end. Everex's Stephen Dougherty, manager of performance testing at the Fremont, Calif.-based firm, said Everex was not likely to be among them.

Icecap *cools chip to 0° Celsius to prevent overheating*

"We've run the thing for weeks at a time, and it gives high performance, but we don't have a way to absolutely confirm that it will be fine running at that speed," Dougherty said. While the firm believes it unlikely that users would suffer problems such as incorrect calculations while using the device, he said, "until Intel has said it can operate at that range of temperature, we don't know for sure."

An Intel spokeswoman said that Intel was familiar with the Velox technology but was not working with the firm. She also warned that Intel considers it a bad idea to use chips in ways that have not been specified by Intel.

Dougherty said that Everex was likely to use Icecap to help it design next-generation systems in advance of Intel's delivery of faster chip prototypes.

Competitive

FROM PAGE 1

payoff comes from deploying strategic systems *inside* the organization.

"Today the most strategic use for information technology is to improve internal processes," said Linda George, director of corporate information services at Gencorp. "It's a way for us to be more corporately effective."

A few examples follow:

- Gencorp has taken steps toward re-engineering various cost centers in the firm with an eye toward leveraging information technology, she said.
- At Paine Webber Group, IS has concentrated on simplifying and consolidating internal information feeds to traders, said Robert Beamosche, director of MIS.
- MCI Communications Corp. reduced double planning and double billing and trimmed staff by two-thirds after integrating a network and data center operations at an Ohio facility.
- FMC Corp. finished the first phase of an IBM 3090-based procurement tracking system that will completely automate the firm's purchasing.

Once the technology is in place, executives said, advantage springs from maximizing it.

"Anybody can buy the technology," said William Friel, executive vice-president at The Prudential Insurance Co. of America. "Success comes from continually developing and improving user skill sets."

Technology provides a shorter window of advantage, and it keeps newcomers out of the business.

Well-deployed technology poses "a very significant barrier to entry" for new firms in an industry, said Anish Mathai, vice-president at Bankers Trust Co.

The survey polled 92 of the 100 most effective users of IS ranked in the 1990 *Computerworld Premier 100*. The annual ranking examines Fortune 500 services and industrial firms and their IS operations (see special supplement with this issue).

Respondents to the survey included 16 financial services firms, 12 aerospace firms, 11 banks, 10 utilities and nine firms each in chemicals, manufacturing and petroleum. Fewer than nine firms from the diversified services, industrial and automotive, food and pharmaceuticals, retail and transportation categories were surveyed, so their responses were not factored into the industry statistics.

Re-engineering popularity

Financial services organizations lead Premier 100 companies in re-engineering processes to reap the benefits of technology

Q Did your company redesign or re-engineer business processes?

A

Total	Number of respondents (base: 92)
Yes	77
No	13
Don't know	2

Top four industries		Number of companies
Financial services (Base of 16 companies)	Yes	16
Banking (Base of 13 companies)	Yes	10
	No	1
Aerospace (Base of 12 companies)	Yes	8
	No	3
	Don't know	1
Utilities (Base of 10 companies)	Yes	9
	No	1

CW Chart: Paul Mock

Premier concerns

While *Premier 100* firms share common concerns about remaining competitive, each industry faces a different set of IS challenges and concerns. The following are brief summaries for each industry surveyed:

Aerospace. The greatest challenge facing IS executives at top aerospace firms is technological change and integration. Defense budget cutbacks and competition run a close second.

Banking. All 11 banking IS executives polled said their industry will become more competitive during the next year. Three-quarters also feel increased scrutiny from top management.

Changing the size of IS is one solution being explored by many banks. Nine of the 11 banks surveyed said they merged or consolidated data centers during the past year.

Chemicals. Acquiring and integrating the latest technology will be big concerns for chemical firms in 1991, according to the nine chemical companies among the *Premier 100*.

Financial Services. When it comes to re-engineering business processes, financial firms are the most aggressive. All 16 financial services executives said they have re-engineered business processes to take advantage of information technology over the past year.

Manufacturing. Top IS executives in manufacturing agreed with peers in other industries that technological change and integration are among the biggest challenges they face.

Petroleum. The single greatest challenge facing their companies, petroleum executives said, is balancing domestic oil and gas exploration and production with the overseas market. They said the IS mission over the next year will be to improve products and services while keeping costs down.

Utilities. Chief concerns are the strategic use of IS as well as personnel issues such as hiring and training.

CORRECTION

Readers may have been surprised to read that the youthful-looking Les Alberthal, chairman and chief executive officer of Electronic Data Systems Corp., has been at his company's helm for 46 years [CW, Oct. 1]. In fact, Alberthal is 46 years old and has been EDS' CEO since 1986.

In the chart accompanying the story "Bringing up 'baby' computers no small feat" [CW, Oct. 1], the sales projections were reversed for pocket and laptop computers. The correct numbers for laptops range from 1.5 million in 1989 to 2.8 million in 1993, while pocket or handheld computers range from 80,000 to 3.1 million during that time frame.

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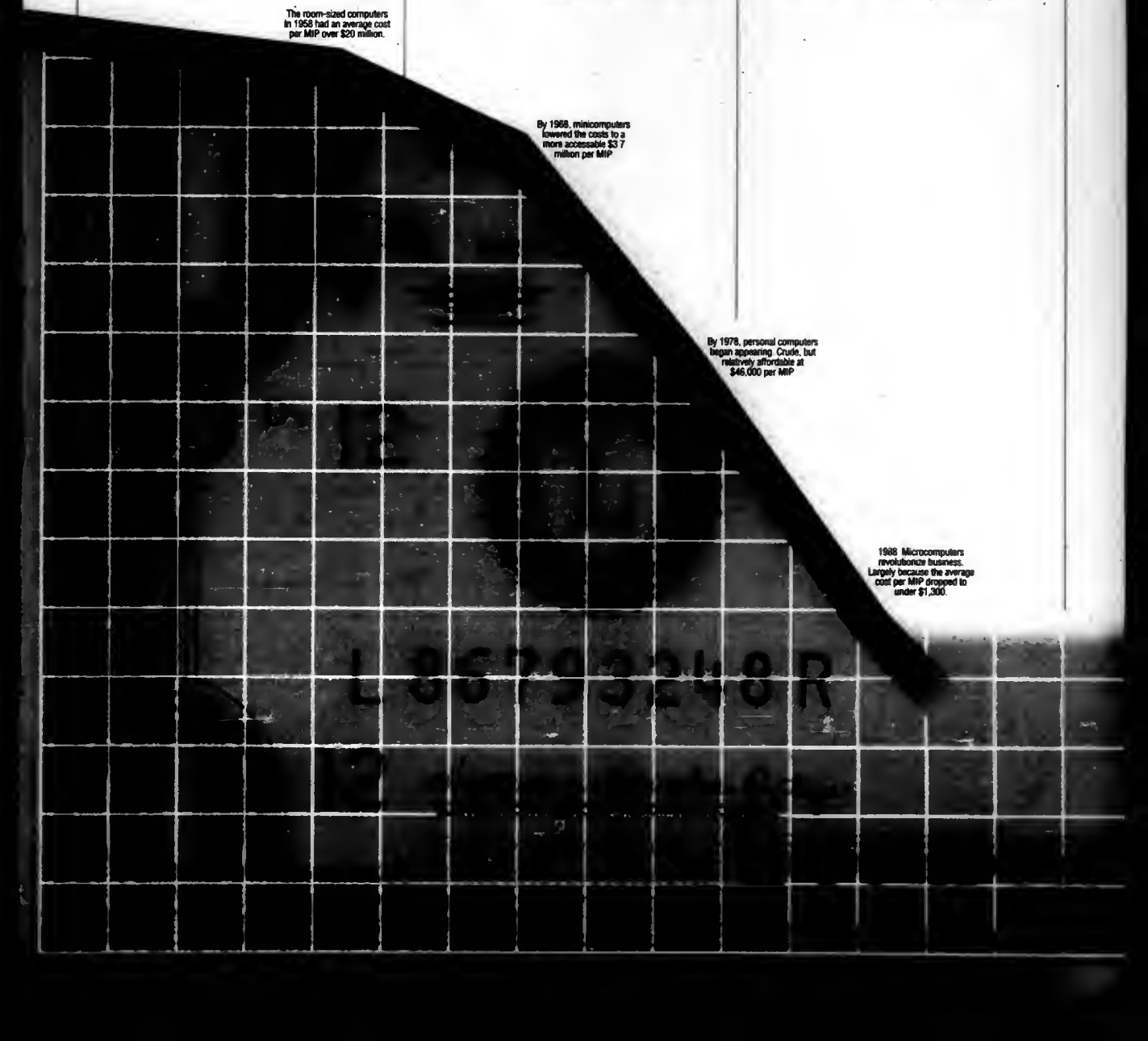

Unisys to tie its lines together

BY ELLIS BOOKER
CW STAFF

NEW YORK — Walking a tightrope between open and proprietary architectures, Unisys Corp. outlined a plan last week for coordinating its disparate product lines and delivering the enterprisewide network computing it said customers will demand in the 1990s.

The Unisys Architecture calls for integrating rather than abandoning Unisys' various proprietary platforms.

The "glue" in the architecture, which will connect different Unisys machines to one another as well as to systems from other computer makers, will be a combination of open and de facto industry standards, particularly network interfaces. Other key elements are Unisys' own software tools, notably its third-generation application programming interfaces and fourth-generation computer-aided software engineering offerings.

Some observers said this mixed-bag approach to openness, providing access to a proprietary world through an open systems window, makes sense for Unisys, which lacks the clout of IBM or Digital Equipment Corp. to set forth an architecture largely built on its own agenda. Unisys, they said, wants to balance its competing needs of protecting existing customers' investments, joining the open systems wave and making new sales to customers looking for multivendor solutions.

Sarah Leen

CEO Unruh *keys on customer protection*

Unisys Chief Executive Officer James A. Unruh last week explicitly stated the goal of protecting the company's current customers.

"From our customers' point of view," he said, "[this architecture] helps them plan for the future, building on the systems and investments they have today."

Unruh also attempted to distinguish the Unisys architecture from the enterprisewide computing schemes of its competitors.

Unlike IBM's Systems Application Architecture (SAA), he said, "we're bringing standards to the proprietary systems . . ."

"What's new is they are saying they're going to make proprietary iron play in the open systems environment," said George Lindamood, Unisys watcher at Gartner Group, Inc. Nevertheless, Lindamood said he was unsure whether there are many differences in the capabilities of the Unisys, DEC and IBM architectures.

John Rymer, senior editor of "Unix and the Office," a monthly report from Seybold's Office Computing Group in Boston, was more upbeat.

"As an architecture, Unisys has actually done a pretty good job," he said. "SAA doesn't know about Unix, which is still in a separate world. With [the Unisys Architecture], Unix is part of the architecture."

Michael Goulde, vice-president of research at Boston-based Open Systems Advisors, Inc., said the commitment to X/Open standards and a common applications environment "could be a strong selling point, particularly in Europe."

However, Goulde noted that enhancements on top of standard platforms, particularly in the case of software applications, are vital for winning customers.

However, at least one of those customers said he felt the new architecture had come too late and doubted that financially strapped Unisys would be able to afford the initiative.

"The new architecture is fine," said Woody Woodward, director of information systems at Calmat Co., a mining concern in Los Angeles. "But I have the feeling they don't have the power to do this with their cash problems . . . they flat don't have the manpower."

Indeed, Calmat, a Unisys V series and A series user, has already begun hunting for a new software provider and is entertaining the idea of moving off the Unisys platforms entirely.

Jerry Weinstein, director of corporate MIS at General Instrument Corp. in Lyndhurst, N.J., said that he and many of his counterparts in the Unisys user committee are very concerned about the company's financial statements and that the phrase "ripe for acquisition" comes up frequently.

However, other customers said they believe Unisys will see its way out of its financial troubles. "The financial [difficulties] are short term," said George Germann, national director of MIS at Ernst & Young in Lyndhurst, N.J., who noted that Unisys is not alone among struggling U.S. computer vendors.

Moody's casts dubious eye on Unisys fortunes

BY ELLIS BOOKER
CW STAFF

Moody's Investor Service downgraded its ratings on Unisys Corp.'s debt and preferred stock last week, saying the company's "prospects for significant, sustainable profit are low."

The rating change, coming at a time when Unisys has been striving to reduce its debt, stung company officials and caused Unisys stock to lose nearly a quarter of its value last week.

The event is the third major financial shock for Unisys in as many weeks. Two weeks ago, Unisys informed its investors that it would suspend its 25-cents-per-share quarterly dividend as part of an accelerated effort to cut its debt. The company has repeatedly said that it wants to cut $600 million to $800 million of its debt this year and a similar amount next year.

The company also said it anticipated a loss in the third quarter but a profit in the fourth quarter. This was not unexpected. As early as April, Chief Executive Officer James Unruh was projecting that the company would probably see a slow third quarter but a gain in the fourth quarter. Ominously, Unisys officials last week seemed to back away from earlier predictions that the company would be profitable for the year.

In a scheduled, companywide videoconference last week, Unruh reportedly described the company's condition as "bleak" but said it would pull through with additional belt-tightening. In answer to a question from the audience, he said that massive layoffs were not planned.

"We're disappointed with the rating change," said a Unisys spokesman, who said the company feels it has made inroads against its debt load.

Unisys stock was trading at 3⅝ points late last week, down from a March high of 17. Unisys, which said it expects sales of approximately $10 billion this year, now has a market value of $580 million, a condition that some observers speculated might make the company ripe for acquisition.

2200, A series get systems refresher

BY ELLIS BOOKER
CW STAFF

Some tangible pieces of Unisys Corp.'s new architecture were announced last week, starting with new versions of the operating systems for its A series and 2200 series mainframes. Both systems will include components of the Open Systems Interconnect (OSI) model.

Unisys also expanded the reach of its development environments — key parts of its cross-platform integration strategy — by announcing that its fourth-generation languages (4GL), Mapper and Ally, will be available on AT&T 3B2 and NCR Corp. Tower systems.

Earlier this year, Unisys announced a port of both 4GLs to Sun Microsystems, Inc. Scalable Processor Architecture platforms. The company's development systems — Ally, Mapper and Linc — will be condensed into one environment in 1991, officials said last week.

More open than ever

Some of the most aggressive commitments to open standards are part of the networking sector of the five-component Unisys architecture. For network transport, for instance, Unisys said it will use Fiber Distributed Data Interface, backbone T3/Synchronous Optical Networks for voice, image, voice and data integration and broadband Integrated Services Digital Networks for voice and data integration.

Likewise, for network management, Unisys said communications within its Systems Management Service (SMS) will use the OSI reference model and rely on the OSI Common Management Information Protocol. This means that SMS will support third-party, OSI-compliant network management products such as AT&T's Accumaster Integrator, Unisys said.

Unisys also said it plans to demonstrate distributed computing using Mapper at this week's Interop '90 conference in San Jose, Calif.

For the end-user interface component of the architecture, Unisys rallied behind Microsoft Corp.'s and IBM's OS/2 Presentation Manager, although it said its end-user interface will also include drivers for Motif, Microsoft's Windows, X Window System and future windowing graphical user interfaces. The application programming interface will use the X/Open Portability Guide for high-level languages, data management, operating systems, networking and data communications and user interfaces.

John Rymer, editor of "Unix and the Office," a report from Seybold's Office Computing Group in Boston, said the architecture's support for multivendor environments and its push for open standards reflects "Unisys' awareness that they have to take the crumbs off the table and rebuild their business."

Tiered structure

The Unisys architecture will cover three tiers of hardware: workstations/work groups, servers and information hubs. The hub, represented by the Unisys A series and 1100/2200 series mainframes, are the top of the hierarchy and are clearly positioned for on-line transaction processing and other processor-intensive, mission-critical duties.

The architecture is composed of five sets of services: Systems Connectivity Services (SCS), Distributed Systems Services (DSS), Information Management Services (IMS), Applications and Information Services (A&IS) and Systems Management Services (SMS). SCS and DSS are the networking subsystem of the architecture; IMS and A&IS are the applications subsystem, and SMS is the management and repository subsystem.

Within each service are three "classes" of capabilities, stretching from open systems interfaces and protocols to proprietary methods pushed by Unisys or its competitors.

The "open" class includes, for example, the OSI model for networking and the X Window System model for user interfaces. The "premium" class includes both Unisys proprietary products like its Mapper and Ally fourth-generation languages or "value-added" extensions to the open system capabilities. The "complementary" class includes non-Unisys de facto standards such as IBM's Systems Network Architecture that will be supported by the architecture in order to connect Unisys hardware or software in multivendor settings.

Intel chip, card aim at portable PCs

BY JIM NASH
and MICHAEL FITZGERALD
CW STAFF

Intel Corp. this week is expected to unveil both its 80386SL chip and its first memory card. The personal computer components will have an almost immediate impact on portable and perhaps even desktop computers.

Sources close to the company have said the 386SL will have the same power-management capabilities currently available only in twin chip sets, at a price below Intel's 80386SX chip. It is expected to be announced Oct. 15 but could be unveiled as early as today, when Intel will introduce its Flash Memory Card. The card is a solid-state replacement for floppy disks.

The announcements could put Intel in a solid leadership position in the laptop and smaller computer market, the fastest growing piece of the PC pie.

As described by one analyst, who asked to remain anonymous, the 386SL is a low-power 386 chip designed for the laptop, operating at anywhere from one watt to an undisclosed full-power setting with numerous sleep modes.

Other sources, both in and outside Intel, have confirmed that it will feature a 386 microprocessor kernel, a small cache memory, a cache memory controller chip and peripheral logic chips. Contrary to previous media reports, the chip will not sport a 80387SX math coprocessor or an IBM Video Graphics Array-compatible graphics chip, according to a company source who requested anonymity.

Gathering microprocessors off a computer's motherboard and placing them on a single chip will eventually shrink computer sizes and could cut their prices. Because the chip combines the system support logic, it uses less power, making it ideal for use in notebook computers.

Pricing the 386SL below Intel's 386SX chip may make the 80286 obsolete, one analyst pointed out. He said the 386SL is designed generically enough to replace 286 chips in production today.

The new chip addresses Intel's mandate to increase the number of microprocessors and transistors on each chip. Intel is one of several chip makers reputed to be working on similar chips.

The Flash Memory Card, which is about the same size as a credit card, comes in 1M- and 4M-byte versions. Intel is releasing a Flash Memory Card developer's tool kit for notebook computer makers who purchase Intel chips.

A number of companies are rumored to be readying notebook or palm-top systems that use the card's media for Comdex/Fall '90 next month. Among them are Atari Corp., AST Research, Inc., Dell Computer Corp., Nippon Electronic Corp. and Toshiba America Information Systems.

Apple boasts of Mac attack

BY JIM NASH
and JAMES DALY
CW STAFF

Apple Computer, Inc. executives last week outlined an aggressive five-year battle plan with which they hope to recapture the firm's eroding market share.

The Cupertino, Calif.-based company plans to start the offensive next Monday with the introduction of three new systems, including a long-awaited entry-level model — the Macintosh Classic — listing for $999. The product launch will be followed up with a $40 million advertising campaign.

Since 1987, Apple has seen its portion of the personal computer market slip from nearly 15% to just 10%, according to Dataquest, Inc., a San Jose, Calif.-based research firm.

Apple Chairman John Sculley said no sacred cows will be spared in order to restore the company to its former glory. "We're going to make some significant changes," Sculley said.

The first tradition to fall may be Apple's gross profit margin, which has been among the highest in the industry. Last year, its profit margin was 54%. Sculley said Apple will accept smaller profit margins as long as it gains market share.

However, analyst Bruce Lupatkin at Hambrecht & Quist, Inc. in San Francisco said he expects to see margins drop no more than "a couple of percentage points" during the next few quarters.

Some analysts warned that Apple's foreseen turnaround may be beyond its grasp. "You can't lose market share over a sustained period and then suddenly dig it up overnight," said Charles Rothchild, an analyst at the Jersey City, N.J., offices of Pershing & Co.

Apple has also become mired in a series of internal reorganizations, executive resignations and shifting marketing strategies during the past few years.

Both Sculley and Chief Operating Officer Michael Spindler said the company is considering moves never before taken at Apple, including the licensing of its technology to other firms. Although neither executive would comment on reports that Apple is working with Sony Corp. for this purpose, Spindler said that Apple's relationship with the Japanese electronics giant is "intensifying."

NEWS SHORTS

Met Life will flee Manhattan

Metropolitan Life Insurance Co.'s information systems director, Daniel Cavanagh, has confirmed that his company is looking at moving its New York data center elsewhere. "It will happen in weeks or months," he said. "We're close." Met Life is looking at sites in upstate New York and in neighboring New Jersey to reduce costs and to be able to do such things as add an uninterruptible power supply and a more up-to-date cooling system, he said.

Color 'luggable' from Toshiba

Toshiba America Information Systems announced what may be the first portable computer with an IBM Video Graphics Array color display to be made commercially available to U.S. buyers. The Toshiba T5200C will retail for $9,499 and is scheduled to hit the market next month. Essentially, the T5200C is a desktop machine in an 18.7-pound package. Based on Intel Corp.'s 80386SX chip, it runs at 20 MHz, comes with a 200M-byte hard drive and features 640- by 480-pixel resolution, with up to 16 colors displayed at one time. The machine is not battery powered.

Burlington Northern names CIO

As of last week, Fort Worth, Texas-based Burlington Northern Railroad — No. 4 in the Fortune 500 railway transit category — has a new top IS position and the man to fill it. Former Nolan, Norton and Co. consultant Robert Hanson came on board as Burlington Northern's first executive vice-president and chief information officer; he will also be the first to run the railroad's IS operations out of the Fort Worth headquarters. Former Vice-President of IS Brock T. Strom becomes a senior vice-president, reporting to Hanson from the IS services department in St. Paul, Minn.

Cray unveils supermini

Cray Research, Inc. officially entered the minisupercomputer market last week by unveiling the Cray XMS system at the semiannual Cray User Group conference in Austin, Texas. The system is scheduled to be available for customer deliveries next month. The 64-bit XMS, which runs the company's Unicos operating system, has a peak vector performance of 36 million floating-point operations per second (MFLOPS) and a peak scalar performance of 18 MFLOPS. It has one central processing unit and is available with 32M, 64M or 128M bytes of memory, the company said. Cray Research is also developing a Cray Y-MP-compatible supermini, slated for delivery in the second half of 1991.

Fiat buys Prime workstations

The Fiat Group, which is headquartered in Italy and is the parent company of the well-known automobile manufacturer, has signed an agreement with Computervision, a Prime Computer, Inc. company, for the purchase of 400 of Computervision's Cadds4X workstations during the next 12 months. The workstations will be used to automate the different phases of the design process, including conceptual modeling, design and drafting. Fiat Auto, Prime Computer Italy and Computervision U.S.A. have also agreed to undertake joint development of new design and drafting software within the Cadds4X environment. Computervision has an installed base of more than 150,000 worldwide.

DEC to rename Lanworks

Digital Equipment Corp. has decided to change the name of Lanworks rather than risk delaying shipments of the personal computer integration product while it engages in a lengthy legal battle. A Maryland-based company named Lanworks, Inc. challenged DEC's use, and a federal judge has issued a preliminary injunction to stop DEC from using the name in several states. The first Lanworks product began shipping on time last month; a new name has yet to be chosen.

More news shorts on page 132

NREN legislation gains new life

BY GARY H. ANTHES
CW STAFF

WASHINGTON, D.C. — After months of languishing and weeks in a dispute with a rival bill, pending legislation that would establish a five-year, $1.9 billion federal high-performance computer and communications program is about to move forward, sources said late last week.

The program, originally spelled out in a bill sponsored by Sen. Albert Gore Jr. (D-Tenn.), would sponsor the development of a National Research and Education Network (NREN) with bandwidth in the billions of bits per second and large-scale parallel computers operating at trillions of operations per second. It also calls for the establishment of nationally distributed libraries of software and data and stepped-up funding for basic research and education.

The bill, crafted by the U.S. Senate Commerce Committee in 1989, gives primary funding and responsibility for the NREN to the National Science Foundation (NSF), which has already begun beefing up its giant NSFnet by boosting the capacity of its backbone to 45M bit/sec.

However, this year, a rival bill sponsored by Sen. J. Bennett Johnston (D-La.) and the Senate Energy Committee appeared, earmarking NREN funds and responsibility for the U.S. Department of Energy. A battle for ownership of the project ensued between the senators and their committees.

What to do?

The Energy Department, faced with budget cuts for several reasons, including the decreased importance of its nuclear weapons programs, was looking for new things to do and new ways to pay for them, government sources said. "The federal energy labs are desperately looking for a new mission," one Senate staff member said last week.

Presently, an agreement between the rival committees is near, and a compromise bill is likely to be approved by both camps this week, a staff aide involved in the negotiations said.

The aide said that the new bill will give responsibility for building the network to an interagency "federal network council" made up of officials from the NSF, the National Aeronautics and Space Administration and the Departments of Energy, Defense and Commerce. NSFnet would be the likely base for NREN, he said.

The new bill may be attached as an amendment to another Senate bill, but in any case, it must be approved by both houses of Congress.

VAX

FROM PAGE 1

and 6400s," agreed Barry Willman, an analyst at Sanford Bernstein Co. in New York. Across the Atlantic, DEC's European operations last week began slashing prices by 26% to 35% on existing 6000s, said Karlyn Kilroy, an analyst at Technology Investment Strategies Corp. in Framingham, Mass. The same scenario will undoubtedly repeat itself in the U.S., she added.

Willman said anticipation of the new machine's fall debut created a "significant air pocket" in sales of the present high-end VAX 6000s.

At prices ranging from $300,000 to $1 million, the Model 500s will not — at first blush — look much more expensive than their predecessor 400s. But if DEC holds true to previous memory prices of more than $1,000 per megabyte, the new 128M-byte memory board required on the Model 500s could give some users pause.

The maximum memory on a Model 400 now is 256M bytes, but only in 32M-byte increments, which take up several slots on the machine's backplane. "By quadrupling the amount of memory on a board [for the Model 500], DEC is reducing the slots their customers have to devote to memory," Christiansen said. The maximum memory the Model 500s will be able to hold is 512M bytes.

"I've got a sneaking hunch this upgrade is not going to be real cheap," said Kevin Obermann, network manager for the engineering department at Lawrence Livermore Laboratories in Livermore, Calif.

"If we have to buy all new memory, that would be another consideration on upgrading. I'm shocked," said Scot Shepherd, a system administrator at Chaparral Steel Co. in Midlothian, Texas. "But I look at a memory upgrade like a CPU upgrade. If you need it, you need it."

Chaparral is in the final stages of automating its main headquarters and three steel mills under all-DEC systems, developing applications on Smartstar's fourth-generation language for DEC's RDB datsbase. "We're considering the new 6000s against a VAX 9000 [mainframe] right now," Shepherd said.

At performance ratings that reportedly run as high as 60 million instructions per second (MIPS), the high-end Model 500s will indeed encroach upon the low end of the VAX mainframe's power. Yet analysts and customers contacted last week seemed convinced that a possible cannibalization of low-end VAX 9000s, which start at around 40 MIPS, would not be a significant issue for DEC.

The most important technical changes in the Model 500s include a newly enhanced XMI bus supporting at least twice the data throughput of its predecessor and availability of a fully duplexed Computer Interconnect Interface, rather than the single interconnect interface now available on the VAX 6000s.

The combination of the XMI bus and duplexed Computer Interconnect Interface should alleviate previous system bottlenecks.

Facts on VAX, etc.

DEC will be announcing several significant additions to its product line, including the following:

- Six new models at the top end of the VAX 6000 line, Models 510 through 560. Priced at roughly $300,000 to $900,000 and ranging in power from 13 MIPS to 70 MIPS, these new minicomputers will nibble into the lower rungs of VAX 9000 mainframe processing power.
- A new symmetrical multiprocessing machine based on six Intel Corp. 1486 chips and targeted at small and medium-size businesses. The DEC/Intel box, to be announced Oct. 16, will run the SCO MPX version of Unix System V from The Santa Cruz Operation.
- A new line of reduced instruction set computing (RISC) servers based on chips from Mips Computer Systems, Inc. The 28-MIPS Decsystem 5500, which is scheduled to be introduced Oct. 31 at Unix Expo in New York, will replace the Decsystem 5400 and 5800 lines.
- A new Vaxstation intended to shore up the price/performance gap between DEC's VAX/VMS workstations and its RISC workstations. It will join the Vaxstation 3100 family at the top of that line.

MARYFRAN JOHNSON

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Users still dissatisfied with current CD-ROM offerings

BY RICHARD PASTORE
CW STAFF

BOSTON — Compact disc/read-only memory (CD-ROM) technology still seems haunted by its image as an overly complicated alternative to books. As evidence, one of the highest-profile announcements at the CD-ROM Expo here last week was Time Magazine's current-events almanac on CD.

Some business users complained that CD-ROM technology and applications have not yet satisfied their needs. At an Expo conference on productivity, the consensus among attendees and speakers was that all too often, CD-ROM offerings are merely repackaged books, databases and software.

"Where is the value added?" asked one insurance industry information systems staff member, noting that productivity is probably decreased by putting something such as a dictionary on CD. Unless the CD platter is already in the drive and booted, it is usually faster to grab the book and look up your word, he contended.

Expo-goer Edward Hill was searching for technology that would help his hospital integrate a CD-ROM-based *Physician's Desk Reference* with patient databases running off a mainframe.

Hill, assistant vice-president of IS at Winchester Hospital in Winchester, Mass., did not find what he was looking for.

"The technology's getting there, but it's not there yet," he said.

"CD-ROM is not the best answer for everything," added Gian Argentati, manager of corporate engineering standards at Ingersoll-Rand Co. in Phillipsburg, N.J. "It's best for storage and retrieval of static data, which does not have to be changed much."

Ingersoll-Rand ships out parts catalogs on CDs to its 50 divisions around the world. Argentati said CD-ROM is the right technology for this job because of the company's desire for more secure data integrity.

Despite what seemed to be a general lack of enthusiasm among Expo attendees, not all of the products unveiled at the show were repackaged magazines or databases.

In the software arena, Dataware Technologies, Inc. announced that its CD Author publishing system is now available for Sun Microsystems, Inc.'s Scalable Processor Architecture-based workstations and Digital Equipment Corp.'s VAX family.

The releases are designed for corporate customers who wish to continue developing applications in-house on personal computers while having DEC or Sun systems read and index the data, the Cambridge, Mass.-based company said.

Windows-compatible

A number of companies ported their CD-ROM software to Microsoft Corp.'s Windows 3.0 environment. Knowledgeset Corp. in Mountain View, Calif., released a Windows version of its Graphic Knowledge Retrieval System, which uses hypertext links to quickly navigate through data. Scheduled to ship in the first quarter of 1991, the product is priced at $75.

Meridian Data, Inc. unveiled Windows CD, a CD-ROM publishing system for the Windows 3.0 environment. A streamlined version of the firm's VR Publisher 5.0, it features the software, CD-ROM drive and tape drive necessary to organize and output data for CD-ROM. The system is slated to ship next month at a price of $18,195.

In addition to the publishing software, Meridian also unveiled a unit that will write the data onto blank compact discs, eliminating the need to use outside mastering facilities. VRS Professional supports DOS, Windows 3.0 and the Apple Computer, Inc. Macintosh environment and is expected to ship the first of next month. It costs $36,000, including publishing software.

On the hardware front, On-line Computer Systems, Inc. in Germantown, Md., introduced a turnkey CD-ROM package for Novell, Inc. Advanced Netware 286 networks.

Composed of small computer systems interface CD-ROM drives, controllers and software, the system connects directly to a dedicated file server or external bridge running Netware Version 2.1 or higher. IBM Personal Computer AT-style single-drive packages sell for $3,495, and four-drive versions list for $5,795. IBM Micro Channel Architecture versions cost $100 more.

For the record, the Time Magazine CD-ROM Almanac includes the full text from 1989 *Time* issues and major news items dating back to 1923 — a total of nearly 5,000 articles. The CD also packs illustrations, a current-events quiz and an almanac-style facts-and-figures compendium. The release, intended for educational institutions and libraries, is slated to ship in two weeks at a price of $195.

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ORACLE for Macintosh received its share of acclaim from InfoWorld readers, who named it Macintosh Product of the Year.

InfoWorld readers also named Oracle's newest desktop product, ORACLE Server for OS/2, product of the year. As did subscribers of DBMS Magazine, who rated ORACLE Server for OS/2 the best database server.

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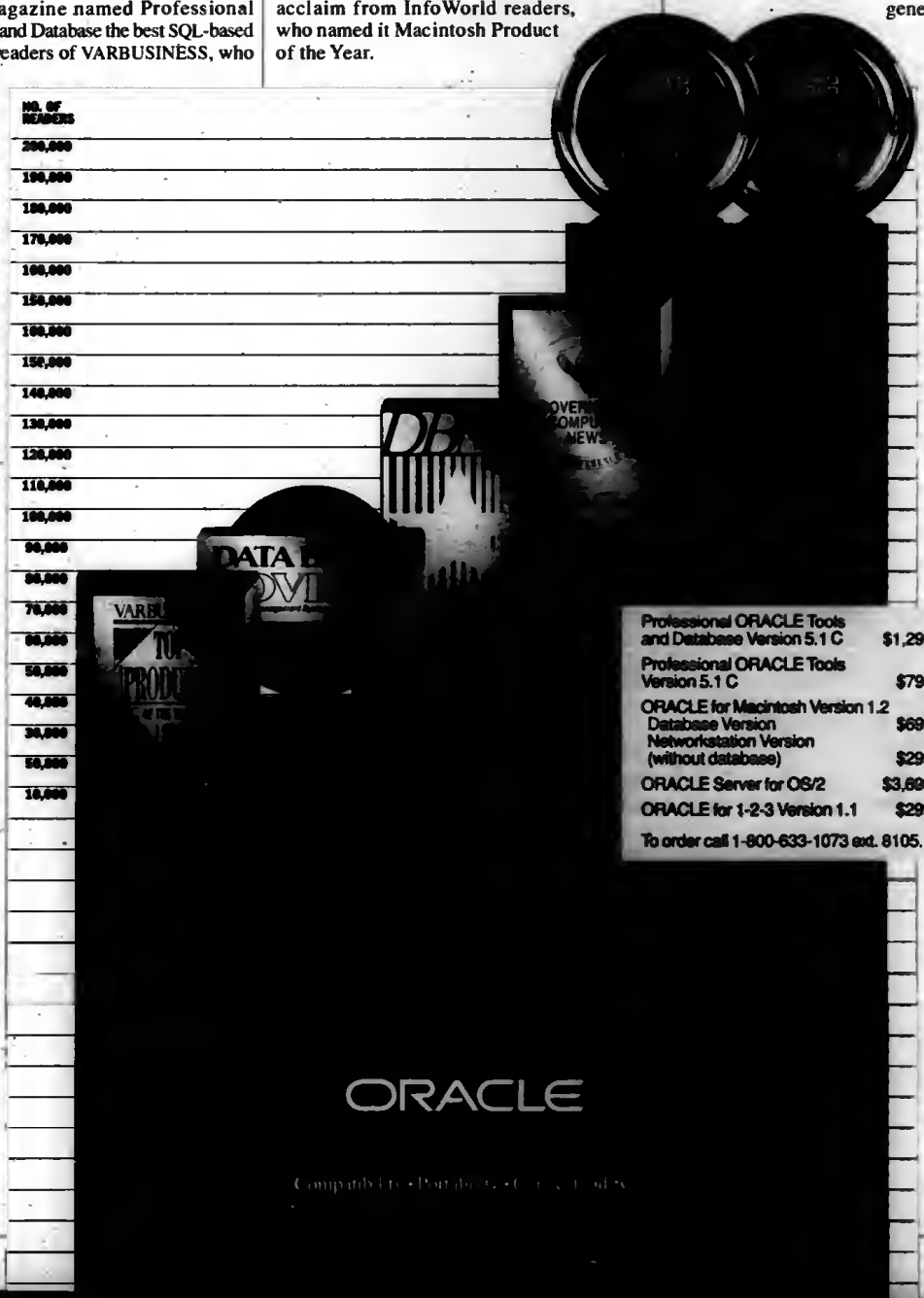

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MCA allies form consortium

BY MICHAEL FITZGERALD
CW STAFF

IBM may be admitting that there are cracks in the foundation of its Micro Channel Architecture (MCA).

IBM, along with Intel Corp., NEC Technologies, Inc., NCR Corp., Ing. C. Olivetti & Co. and several other vendors, will announce on Wednesday the formation of the Micro Channel Developers Association (MCDA), a group designed with the purpose of improving the flow of information on MCA between IBM and its licensees.

Analysts said IBM's decision to participate in the licensee-driven vendor group indicates that it may be worried about mounting support for MCA rival Extended Industry Standard Architecture (EISA).

While MCA-based systems have outsold those using the competitive bus, EISA vendors are expected to gain market share rapidly during the next three years. Nevertheless, Industry Standard Architecture machines using the IBM Personal Computer AT bus continue to outsell both architectures combined by a wide margin.

The projected loss of market share is what has IBM worried, analysts said.

"It sounds like IBM has decided they'll lose significant market share if they don't make [MCA] more open. At this point, it's about one year too late," said Robert Charlton, a high-end PC analyst at Dataquest, Inc., a market research firm in San Jose, Calif.

Charlton added that if IBM were to make MCA more open by lessening its stiff licensing structure, the association could go a long way toward altering perceptions about the proprietary nature of MCA. An IBM spokesman said the company felt MCA was an open architecture already and saw no need to change its licensing arrangements.

Not all analysts viewed the announcement as a concession by IBM that MCA was failing.

"IBM is doing such a good job in the PC business right now — they're taking a lot of share on the desktop, have an incredibly aggressive pricing strategy and [are] supporting dealers better than ever before — that I think they're just trying to build their momentum [through the MCDA]," said David Korus, computer systems analyst at Kidder, Peabody & Co.

Officially, the MCDA will serve as a clearinghouse of information about MCA, according to an IBM spokeswoman.

Members of the group said they hoped to be able to get products out the door faster and influence IBM on the direction of MCA.

Representatives of 14 member companies will form the MCDA's executive committee.

Retix aims to unseat TCP/IP

BY JOANIE M. WEXLER
CW STAFF

SANTA MONICA, Calif. — A ray of light may have seeped through the Open Systems Interconnect (OSI) fog last week when Retix announced software aimed at usurping the widespread Transmission Control Protocol/Internet Protocol (TCP/IP).

Retix claimed its products outshine most implementations of TCP/IP on both memory requirements and performance. The company will demonstrate OSI LAN Transport for DOS and OSI LAN Transport for OS/2 — which are targeted at hardware vendors for integration into computer equipment — this week at the Interop '90 show in San Jose, Calif.

OSI's large memory requirements and speed inefficiencies have traditionally been perceived as two of the many barriers to OSI acceptance. Retix cited test results of 8M bit/sec. throughput for the DOS version and 4.8M bit/sec. for the OS/2 version on Intel Corp. 80386-based Ethernet local-area networks, depending on which LAN adapter card is used. The DOS version reportedly uses 56K bytes of personal computer-resident memory, compared with the up to 128K-byte requirements in existing OSI transport implementations.

Edwin Riddle, head of communications and network systems at the NASA Langley Research Center in Hampton, Va., said the announcement could be good news for government agencies, which must support OSI standards in new procurements.

"Our big OSI concern has been a lack of an equivalent protocol to TCP/IP for interoperating among different vendors' equipment," he commented. "Right now, we get 1M to 2M bytes of throughput with our TCP/IP implementation if we're lucky, and our TCP package uses over 100K [bytes] of memory."

Riddle operates several Ethernet networks running FTP Software, Inc.'s fairly robust TCP/IP for DOS and OS/2 implementations. "I would have some serious questions about Retix's throughput benchmarks," Riddle acknowledged, "but I'd sure like to try the products."

New and old OSI applications, as well as DOS and OS/2 applications, can run on top of Retix's software, which is slated for availability next month.

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Network General enhances error-seeking analyzer

BY ELISABETH HORWITT
CW STAFF

MENLO PARK, Calif. — Local-area network users' demands for an ever-larger piece of the corporate backbone may be on the verge of colliding with an increasingly profit-conscious top management. That's the scenario Network General Corp. hopes to take advantage of with last week's introduction of an enhanced version of its Sniffer product that is said to pinpoint glitches, bottlenecks and bandwidth-hogging applications across LAN-to-WAN connections.

The need for such a device is embryonic but growing rapidly, according to Vertical Systems Group. Out of 1,750 companies surveyed by the Dedham, Mass.-based research firm, 59% said that LAN traffic would take up more than 25% of their WAN bandwidth by 1994.

The WAN/Synchronous Sniffer Analyzer is based on Network General's Sniffer LAN diagnostic tool, so users can employ a common set of commands and screens to analyze the same wide range of high-level network protocols on either LANs or LAN-to-WAN connections, Network General Chief Executive Officer Harry Saal said.

For example, WAN Sniffer can figure out which LAN device, application or network protocol is generating an unwarranted amount of LAN-to-WAN traffic, Saal said.

One boon to the budget-conscious is the product's ability to identify the exact source of network slowdowns, often enabling network managers to boost response time without adding expensive bandwidth, Saal said.

"Having something like Sniffer is very important to locate degradation or errors if they do happen to creep in," said Robin Layland, a manager of IBM Systems Network Architecture (SNA) software engineering at The Travelers Corp. Bridges and routers have primitive error correction at best, Layland said, adding, "If they encounter an error or confusion, they throw [the offending packets] away and assume that someone will ask for a resend."

With its ability to trace bandwidth use to individual users and applications, Sniffer could provide the industry with a much-needed LAN-to-WAN chargeback system, said Ken McGee, program director at Stamford, Conn.-based research firm Gartner Group, Inc.

Chargeback is of increasing importance to companies that are "turning to outsourcing because their telecommunications expenses are out of control," he added.

WAN Sniffer analyzes traffic traveling over links of up to 64K bit/sec. Support for 1.5M bit/sec. T1 links is planned for a future release, Saal said.

Available immediately, a dual-topology LAN/WAN Sniffer Analyzer is priced at $21,750, with a WAN upgrade to an existing LAN Sniffer costing $5,500.

HP opens up net software to Sun

BY J. A. SAVAGE
CW STAFF

Staying true to its promise of "open" open systems, Hewlett-Packard Co. said it will offer its 10-month-old network management software package for rival Sun Microsystems, Inc.'a Unix workstations as well as its own Apollo Division computers.

HP also said it is considering porting the product to IBM'a and The Santa Cruz Operation's versions of Unix.

Trying to establish the product specifications as standard for Unix, HP submitted its framework to the Open Software Foundation for approval late last month. The submission was cosigned by IBM.

The product, the Openview Network Management Server, allows a network or systems administrator to track CPU and memory use throughout a heterogeneous network. In addition to the basic Unix product, the new version encapsulates applications so they can be initiated remotely and allows even-status communications between MS-DOS-based servers and Unix servers. It also supports Microsoft Corp.'s Windows Version 3.0.

Users of the Apollo DN 10000 can take advantage of Openview if they implement the latest version of the Apollo Domain operating system, Version 10.3, according to Duncan Campbell, marketing manager at HP's Network Division.

Openview has run on HP'a Unix-based 9000 series since the beginning of the year. A DOS version of the product has been available since 1988.

"HP is trying to convince people not to bother with system software and concentrate on value-added specific applications," said James Herman, an analyst at Northeast Consulting Resource, Inc.

Sun also has a network management product, Sparcserver Manager. While it is also Unix-based, it is bundled to work only on Sun products. "Sun can't lose," Herman said. "People will either use Sun's network manager or their platform."

The unbundled HP network manager costs $7,000 for a user license.

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HEWLETT PACKARD

San Francisco businesses decry VDT proposal

BY J. A. SAVAGE
CW STAFF

SAN FRANCISCO — In the first public hearing concerning San Francisco's proposed VDT legislation, small businesses said it could put them out of business and large businesses said it could cost them more than $30 million per firm.

The legislation, backed by a majority of San Francisco supervisors, would mandate adjustable tables and chairs for businesses with more than 15 VDT workers. It would require nonglare screens for workers, at their request, and a minimum of five feet of space between the back of a VDT and the next worker, among other provisions.

Two of the more controversial portions of the bill — requiring that management give pregnant workers alternative work if requested and promotion of eye examinations — were dropped from the package "due to the potential for legal challenges," said supervisor Angela Alioto, chairwoman of the City Service Committee (San Francisco city and county share jurisdictions). The city attorney's office feared that the state and federal governments preempted the city and county in those areas and that it would be overturned, as was a similar measure in Suffolk County, N.Y., on that technicality.

> THE OVERALL economic state of affairs in the U.S. is seen as the largest single factor contributing to the drop-off.

The legislation was drafted by a coalition of unions, including Service Employees International, the Communications Workers of America and the Newspaper Guild. It faces opposition from the Small Business Advisory Committee and some of San Francisco's largest corporations, such as the Bank of America.

"It would cost $14 million for equipment and training, mostly due to retrofitting 6,000 workstations," said John Cammidge, vice-president of employee relations at Bank of America. He said it would cost at least another $30 million to implement the "five feet" rule.

Robert Harrison, director at the Occupational Medicine Clinic at the University of California, San Francisco, said the measure would save money when compared with the cost of treating worker injuries. He calculated the cost of treatment for one year at $3,120 and the cost of retrofitting one workstation at $1,135.

NPUG, Prime seek cause of declining rolls

BY SALLY CUSACK
CW STAFF

NATICK, Mass. — Alarmed by a 20% decrease in membership for the 1989-1990 year, the National Prime Users Group (NPUG) Membership Committee, in conjunction with Prime Computer, Inc. in Natick, Mass., is surveying its members via a mass mailing to uncover the reasons behind declining renewals and enrollments.

The overall economic state of affairs in the U.S. is seen as the largest single factor contributing to the drop-off, said Peggy A. Long, western regional representative for NPUG.

Referring to last year's annual NPUG convention, which was held in Orlando, Fla., Long said that "six weeks out we had the highest registration we ever had, and three weeks before the conference we had the lowest numbers we've had in five years."

Members tended to lock into the discounted early-registration rates; numbers reflecting those signing on at later, full price fees were significantly smaller.

Belt-tightening barrier

Long and the convention staff put out a series of random calls to the user community to pinpoint the problem, and the majority of users responded that their companies were not inclined to pay for the trip and expenses last year.

With many companies tightening belts and budgets, this did not come as a big surprise to the NPUG organizers. According to Roland K. Kittredge, senior manager of marketing support at Prime and a NPUG board member, NPUG's membership is on an individual, as opposed to corporate, basis. Estimating that there are currently 2,000 members worldwide, Kittredge cautioned against placing too much significance on the recorded numbers, as "many individuals in organizations share the information provided to the NPUG member."

In preparation for next year's meeting in San Antonio, Texas, Long is working to step up publicity for the group and hopes to reach more third-party software developers and new users who may be unaware that such an organization is available to them.

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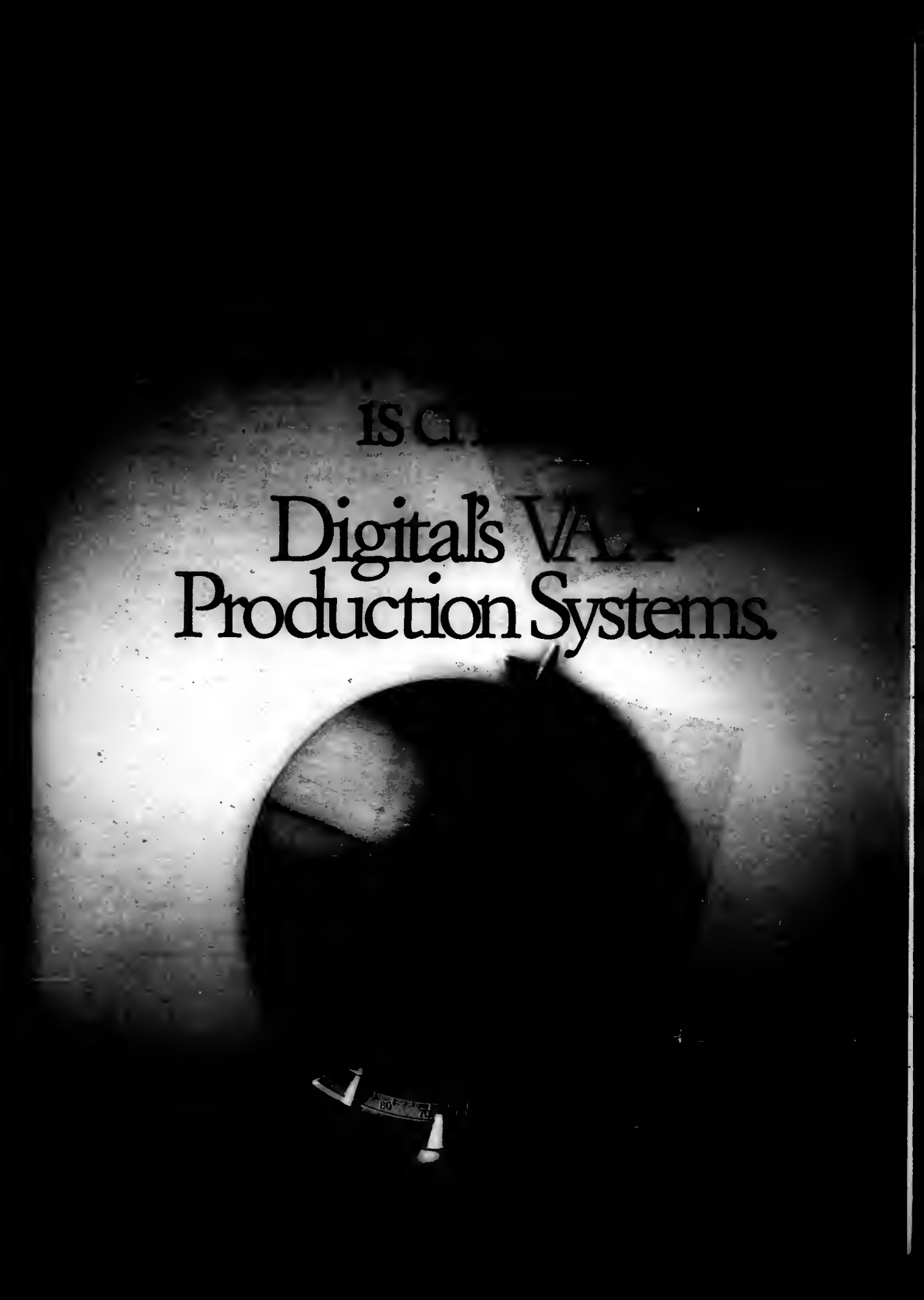
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ADVANCED TECHNOLOGY

Optical processing: Smooth-flowing traffic

Data transmitted by light instead of electrical impulses holds significant promise for a freed-up data highway

BY JAMES DALY
CW STAFF

To fully appreciate the concept of optical computing, which uses pulses of light instead of currents of electricity to carry information, it may be necessary to climb into a helicopter.

Imagine for a minute that you're hovering above Manhattan. It is rush hour, and the bridges radiating from The Big Apple are crammed with cars anxious to escape the crowded isle. Because they can only hold so much traffic, however, commuting is a painfully slow process.

Consider how much easier the ride would be if 100 more bridges were built or if each bridge was a thousand lanes wide. A team of researchers at AT&T's Bell Laboratories has done just that and applied it to the field of high-performance computing.

"We've got the ability to open up the data highway tremendously," said Tod Sizer, a member of the technical staff of Bell Laboratories' Optical Computing Research Department in Holmdel, N.J.

Light beams can be programmed to move through the air without dispersing, Sizer said, and pass through each other without interference. An optical computer could send millions of signals to the smallest of switches without a single physical connection.

Earlier this year, the Bell Laboratories team announced what it describes as the first digital optical processor, which department head Alan Huang called a key breakthrough toward realizing its goal of producing a full optical computer within the next two decades.

No bottlenecks

What has excited researchers of photonics is that optical-based systems quickly eliminate computing's classic speed conundrums: Too much information is trying to get to the same place at the same time.

Until now, the typical method of getting computers to run faster was by packing more chips into the system design. But that produced unwanted baggage: Heat increases proportionally to the number of chips crowded into a small area, and the electromagnetic fields emanating from the chips can scramble information on an abutting chip.

Electricity must also travel along a wire. If the wires are not isolated, they can garble information on a nearby wire.

Optical computing meets these restrictions head-on. An optical computer would require far less power than an electron-based computer. Also, a computer tapping into the speed of a photon — the basic particle of light — would only be limited by the rules of physics.

Although the concept of optical computing has been kicked around for more than 20 years, the obstacles to producing a machine based on those principles are formidable. "Unfortunately, one of light's greatest strengths is also its greatest weaknesses," said John Caulfield, director of the Center for Applied Physics at the University of Alabama in Huntsville.

Because light beams don't interact, they cannot flip the on-off switches that govern when and where data flows. AT&T researchers tamed that problem in January when they announced Symmetric Self-Electro-optic Effect Devices (S-SEEDS), which handle photons the same way silicon handles electrons. S-SEEDS work as light lenses that control the amount of light passing between processors by opening and closing according to the intensity of the light.

But the S-SEED technology is still in its rudimentary phase. As a result, "Optical computing will never replace electron-based computing, because you've always got to bring electrons into the game at the switch level," Caulfield added.

While photonics has filtered into the computer industry — fiber-optic cabling and optical storage discs have been around for years — an optical-based system could rewrite the rules of high-performance computing. AT&T scientists hope that an optical computer can operate at several hundred million cycles per second, giving it the potential to be 1,000 times as powerful as a Cray supercomputer.

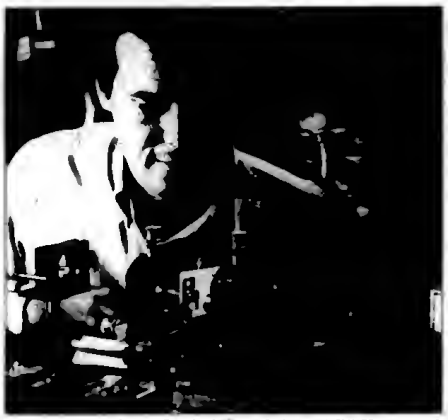
Although it seems improbable that optical-based systems will take over the desktop anytime soon, they are already actively targeted at computationally intensive applications in seismic exploration and geophysics.

Another early use, Sizer said, will come at phone company switching stations, which typically route millions of calls daily. The Pentagon is also interested because optical computers would be more secure.

The repercussions of optical computing, however, could work their way into the home as well as outer space. For example, the higher capacity of optical lines could permit firms to offer such data-intensive services as pay-per-view home television, sporting thousands of titles.

Elements of optical computing are also likely to spin off into the machines we use every day. An early target: PC data bus architectures, which serve as the traffic cop for data passing around the machine and which often account for performance slowdowns.

Optical computing continues to draw enthusiasts. "We all hold beliefs that we hold strongly but just can't absolutely prove at this moment," Caulfield said. "Optical computing is one of my beliefs."



AT&T researchers *David Miller (left) and Jill Henry work on a chip designed for optical computing*

Fishing around with virtual computing

BY MARYFRAN JOHNSON
CW STAFF

Imagine that the machine on your desktop was capable of changing identities on command — one minute an IBM Personal Computer, the next minute an Apple Macintosh.

Impossible, right? Those processor chips with their myriad functions were etched into silicon back at the factory. That's why they call it hardware.

Well, swing off the logic gate into the abstract world of virtual computers, where the boundaries of software encroach on hardware's territory, and the rules of the game can be changed.

"The idea behind a virtual computer is basically taking the notion of software to its logical extreme," said Brian Silverman, director of research at Logo Computer Systems, Inc. in Montreal. Silverman is the author of Phantom Fish Tank, a $30 recreational software package that allows users to design a two-dimensional virtual computer on their PC screen and then watch it in action.

The screen of Phantom Fish Tank is divided into 1,600 tiny cells or squares — cellular automata — that represent the logic gates on a silicon chip. Each cell is in either an "input" or "output" state and by following a few simple rules can change its state (and color) with each tick of the computer clock.

The whimsical name of the program, which runs on IBM Personal Computers, PC-compatibles and Apple Computer, Inc. IIs, refers to the strange undulating patterns made by the cellular automata as they move around the screen.

A fuzzy line

That imaginary PC-to-Macintosh quick-change act described above is one way Silverman explains what virtual computing may one day accomplish.

"That hardware/software boundary could be pushed back a little," he said. "The stuff people think of as hardware could itself be implemented in software."

Another way to think about the possibilities of virtual computing is to picture the grid of a silicon chip as a city map, with roads and intersections etched in concrete. "Now imagine that instead of something solid, you could make it in more reshapeable materials," he explained. "When you graphically changed the map, you would change the function or direction of the road."

The Phantom Fish Tank is more a "proof of concept" than a serious demonstration of virtual computing, Silverman emphasized, and practical uses for virtual computers are at least a decade away.

Still, the game seems to appeal to a diverse collection of users. The software designer remembers one particular day when two teachers told him how useful they found Phantom Fish Tank in their philosophy discussions with their classes. "What grade do you teach?" he asked them.

"Graduate school," the first teacher said.

"Third grade," the other replied.

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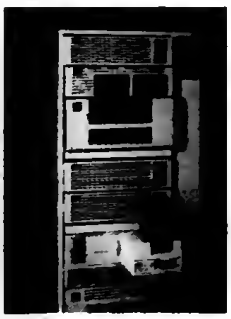

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EDITORIAL

Playing to win

"GONE ARE THE days when information systems could hide in the back office, sheltered from the turbulent winds of corporate change."

Those words appropriately open this year's *Computerworld Premier 100* — our tribute to the most effective users of information technology in the U.S. As much as anything else, what our high-performance IS leaders hold in common are the willingness and ability to enmesh their organizations into the very fabric of corporate competitive strategies.

Today, those strategies are as diverse as the challenges facing the firms, challenges that are fostering some downright desperate situations:

- The threat of war in the Middle East has hammered Wall Street, where big investment houses have never fully recovered from the crash of three years ago.
- The economy's painfully slow slide to a near-zero growth state is sending consumers to the spending sidelines, putting many big retailers into a tailspin.
- The greatest swindle in history — the savings and loan scandal — has paired with a federal deficit of sinful proportions to prompt a proposal for the biggest-ever tax increase in the U.S., further shaking the economy.
- Global competition has driven the U.S. from leadership in virtually every industrial sector except defense-related products — and computers.

Yet through it all, some firms rise above an increasingly dicey situation, seeming to fire on all cylinders no matter what the conditions are.

The *Premier 100* firms continue to invest in information technology, with most companies reporting healthy increases in IS spending for mission-critical technology. As most of the IS managers in the *Premier 100* also said they are under closer scrutiny from senior management than ever before, clearly this group is doing a spectacular sales job to gain the financial support it needs.

At the same time, 70% of the group either has consolidated data centers or will do so shortly to contain costs.

A majority has moved to the hybrid centralized/decentralized IS structure that the futurists of five years ago envisioned. That keeps the IS groups closer to the action and flexible while at the same time maintaining systems security and compatibility.

Finally, virtually all the *Premier 100* companies continue to invest heavily in network solutions and, perhaps most importantly, in human capital through training programs.

So it is by no accident, stroke of luck or "help" from the government that the companies of this year's *Premier 100* are making such effective use of information technology. That is fortunate for them because, as our lead article concludes, "All the ups and downs of life at the top of IS evidenced by the *Computerworld Premier 100* show the battle scars of the 1990s. And to think it's only the beginning of the decade."

LETTERS TO THE EDITOR

Skilled and ready

Your recent In Depth look at the changing work force [CW, Sept. 17] was interesting, but you seem to have missed two important points. The words "degreed" and "skilled" are not synonymous. There are many skilled workers out there who are being overlooked because they have talent and experience but no piece of paper to make them acceptable to personnel departments.

A college education has always been expensive, and many people have not been able to afford it or have had other commitments such as a family or the military. This does not make them unworthy, stupid, unprofessional or second-class citizens. They deserve consideration.

In addition, while companies are forming partnerships with colleges and high schools, they are failing to provide training to the workers they already have. Then, when things get tight, these people are discarded because they no longer have current skills.

If companies are really concerned about the perceived shortage of skilled labor, they should address their own contributions to it.

D. L. Richards
Systems Programmer
Montclair, Calif.

Not blaming IBM

I commend you on your coverage at the 29th annual National Convention of the American Council of the Blind, "Blind IS managers defy career odds," [CW, July 9].

However, I'm concerned about a passage in "Inside Lines," on page 126 that reads, "Computer users at the American Council of the Blind in Denver last week were angry that IBM's new graphical user interface strategy leaves them stranded."

While the quote that follows is accurate, that sentence is not. The American Council of the Blind does not blame IBM for the graphical user interface environment. While we are concerned about the importance of accessibility to the graphical environment, we did not express anger toward IBM or any other company in the computer industry.

We view the graphical environment as progress that is here to stay. We applaud IBM and other corporate efforts to help blind and visually impaired Americans find new ways of accessing the environment and thereby broadening and maintaining their employment horizons.

LeRoy F. Saunders
President
American Council of the Blind
Washington, D.C.

OOPS!

Your publication of "The scoop on OOPS" [CW, Sept. 17] does a disservice to your readers.

While the article starts out by claiming that it will tell you what you need to know about object-oriented programming systems, the author's notes seem to have become mixed up with another article about object-oriented databases.

Object-oriented databases are an important component of OOPS, particularly within the management information systems world, but are by no means the most important.

The "big idea is simple," but it is not that "repetitive programming code should be written only once." Instead, the big idea is that OOPS is about modeling the real world and reducing the so-called semantic gap between users and developers.

To say that OOPS "is a descendant of Unix" because C++ is an extension of C is an error of significant proportions. C is a fairly recent player on the object-oriented language scene and represents the retrofitting of a procedural language with object-oriented extensions.

In the side box titled "Object-oriented guide," the author claims that "not much productivity increase will be seen in the first few years until a library of objects and object modules is built." This is contrary to our experience.

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Charles M. Durrett
Plant Automation Division
Electronic Data Systems
Troy, Mich.

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70. Mining/Construction/Petroleum/Refining/Agric.
80. Manufacturer of Computers, Computer-Related Systems or Peripherals
85. System Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
90. Computer/Peripheral Dealer/Distr./Retailer
75. User: Other _____
99. Vendor: Other _____
(Please specify)

2 **TITLE/FUNCTION** (Circle one)
IS/MIS/DP MANAGEMENT
10. Chief Information Officer/Vice President/Asst. VP IS/MIS/DP Management
21. Dir./Mgr. MIS Services, Information Center
22. Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt.; Dir./Mgr. PC Resources
23. Dir./Mgr. Sys. Development, Sys. Architecture
31. Mgrs.: Supvr. of Programming, Software Dev.
32. Programmers, Software Developers
80. Sys. Integrators/VARs/Consulting Mgt.
OTHER COMPANY MANAGEMENT
11. President, Owner/Partner, General Mgr.
12. Vice President, Asst. VP
13. Treasurer, Controller, Financial Officer
41. Engineering, Scientific, R&D, Tech. Mgt.
51. Sales & Mktg. Management
OTHER PROFESSIONALS
70. Medical, Legal, Accounting Mgt.
80. Educator, Journalists, Librarians, Students
90. Others _____
(Please specify)

COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as a user, vendor, or consultant.
A. Mainframes/Supermins
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Local Area Networks
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Can technology effectively replace human teachers?

GLENN RIFKIN

When I went to school, the most elaborate piece of technology ever seen in the classroom was a movie projector. The teacher would flick off the lights, hit the projector switch and hope that the antiquated 16mm machine would whir and click its way through some boring film about Guatemala without breaking down.

No more. Technology has hit America's schools in a big way. We've all heard about the computer literacy of the next generation, but maybe we haven't realized just how widespread this thing has become.

There are an estimated 3.3 million computers in U.S. classrooms. Personal computers are now used for instruction in 98% of U.S. school districts, according to a survey by the Wirthlin Group in McLean, Va.

This is a fairly amazing statistic when you think that these computers were really not available to the public until 1982 — more amazing when you realize that user interfaces simple enough for a child to use are no more than five years old.

The critical question, however, is whether these technical marvels are simply shoring up an increasingly bleak picture in America's classrooms or are actually producing brighter, better educated students. This question rises beyond K-12 all the way to the college campus.

Eric Orner

Definable benefits?

Is the computer nothing more than an elaborate teaching aid? What evidence do we have, now that a generation of students has been exposed to computers in school, that we are turning out better graduates?

If the '80s were any indication, the sad answer to that question is: not much. Scholastic Aptitude Test scores have steadily declined during the past decade, despite access to computers by precollegiate students.

Interest in critical disciplines such as math and science — areas in which computers should have the most impact — has also continued a dramatic decline. There simply seems to be no hard evidence that computer use has produced better students.

At Dartmouth College, for example, personal computers are required for incoming freshmen. Thus every student on campus has an Apple Macintosh in his dorm room. A Dartmouth professor noted that while students now turn in papers that are clean, readable and without spelling errors, the content of papers is of no higher quality than in precomputer days.

Perhaps it is unrealistic to expect that computers, in and of themselves, are capable of having such a dramatic impact. A computer, after all, is no more or less effective than the person operating it. It is a machine — a tool that, despite great advances in technology, cannot think. As anyone with a PC knows, the technology can be friendly, but not all that friendly.

Teachers, for example, are forced to climb the learning curve along with their students, and many continue to be intimidated by technology. It is tough, if not impossible, to use a teaching tool with which you are uncomfortable.

Older students without a penchant for programming or exploring on their own the often complicated application software packages available will be at a loss to get real value from a computer in the classroom — or anywhere else, for that matter. Students, teachers and parents expecting miracles from the fact that computers are now in the schools are bound to be disappointed.

This is not to say that computers can't be effective in the classroom. In the Wirthlin study, 82% of the teachers surveyed said they believe that using computers increased their students' motivation for learning.

Early school-age children are benefitting from such programs as IBM's Write to Read program, in which 5-year-olds can use computers to write any word they can say. IBM launched Write to Read in 1984 and claims that students in the program are outscoring comparison groups in writing and reading.

IBM correctly points out that computers help provide the kind of one-on-one learning environment that a single teacher cannot offer in a classroom setting. Certainly, in substandard inner-city schools, these aids are invaluable.

Irreplaceable

In an era when the teaching profession has been shamefully devalued, computers may indeed be a salvation in providing remedial skills to young children. However, it is folly to believe that a PC can ever replace a dedicated, talented teacher in a classroom.

The biggest fear of this seemingly positive trend is that computers will become substitute teachers — better than the wide-eyed, confused subs we used as targets of paper airplanes and spitballs, but far worse than a real live professional.

Only a Luddite would openly scorn the use of PCs in the classroom; their potential as teaching tools, especially with advances in such technologies as artifical intelligence, is unlimited.

But the education crisis in America needs more than an infusion of technology. It needs a reprioritization of social values — values that have slipped shamefully and require more than bits and bytes to repair.

Rifkin is a *Computerworld* features editor.

LEWIS PERELMAN

One of the most dangerous myths that is threatening the U.S. economy is the ritual incantation, "Technology will never replace the classroom teacher." The truth is, it already has. By paying lip service to this myth, the computer and telecommunications industries are squandering their most lucrative growth opportunity. Worse, they are undermining efforts to retool America's work force in a way that harms the nation's most disadvantaged people.

Information technology is at least as capable of displacing and transforming labor requirements in education as in any other business; the academic bureaucracy has simply not allowed it to do so in most schools. However, research and practical experience have demonstrated technology's potential in areas of the learning enterprise outside the control of the "educrats."

One firm recently showed me a new computer program it plans to market in 1991 that can teach students of any age to read English up to any level of proficiency — without the aid of a human teacher. Another firm is using laptops to deliver basic education in New York to 1,800 welfare mothers and their children — over the telephone. In the Oklahoma panhandle, public schools are cutting teacher positions and using the payroll savings to help pay for a fiber-optic network that allows students 100 miles apart to take the same teacher's class via two-way interactive video.

In higher education, National Technologic University is an electronic graduate school with no campus or full-time faculty that nevertheless provides continuing engineering education to more than 3,000 students all over the U.S.

These are not unique examples. Over two decades of research shows that computer-based instruction produces at least 30% more learning in 40% less time at 30% less cost, compared with traditional classroom teaching. A research survey published in a leading education journal found at least 125 technologies and methods that proved to more than double the productivity of teaching, yielding at least twice as much learning for each unit of labor time or other cost.

Computer vendors, unless they've been living on Mars, cannot claim ignorance of the classroom teacher's rapid obsolescence. Former IBMer Jack Bowsher published a book last year recounting the five-year effort he led to modernize IBM's $2 billion-per-year employee education system by replacing most classroom courses with instruction delivered by computers and telecommunications.

Unisys' training director is planning to convert at least two-thirds of the company's classroom instructional programs to such "telematic" methods. In general, employers are spending at least 300 times more on computer-based instruction than are public schools.

There are more than 45 million personal computers in use in the U.S. today, compared with virtually none a decade ago. This means perhaps 60 million people or more learned how to use PCs, and almost none of this crucial learning took place in schools. It was delivered by vendors, manuals, tutorial software, videos, hot lines, user groups, books, magazines, help systems, trial-and-error and lots of schmoozing. Many parents and teachers will testify that kids have often led adults in climbing up the PC learning curve.

Some $370 billion will be spent on U.S. schools and colleges this year. About one-third of that amount — more than $100 billion — will be wasted by the failure to employ the most productive off-the-shelf technology for teaching and learning. When other kinds of education are included, learning is about a $400 billion to $600 billion business in the U.S. — the biggest information industry and the most technologically backward sector of the economy.

This is the greatest business opportunity since Rockefeller struck oil. Yet most computer and telecommunications firms are bending over backward to blow it, mainly because of raw fear of the political conflict that must come with challenging an entrenched establishment. Ironically, the same firms are seeing their global competitiveness undercut by the festering ignorance of the U.S. work force. Talk about shooting yourself in the foot!

COMPUTER-BASED instruction produces at least 30% more learning in 40% less time at 30% less cost, compared with traditional classroom teaching.

The U.S.' mostly government-owned, operated and subsidized schools and colleges are this country's collective farms. They are declining for the same economic reason the whole Soviet empire has collapsed: lack of market incentive for productivity and, hence, for technological innovation. Instead of brown-nosing educrats and dumping equipment on schools, the computer industry should be supporting the political movement to restructure education by introducing choice and competition to public education; accounting for student learning, not just attendance; and shifting education budget priorities from labor to technology.

The computer industry's continued failure to support such political action will not only shortchange stockholders but also hurt the U.S.' most disadvantaged people. The well-off will get access to high-tech learning regardless of public policy — through the workplace, the home and other private sources. Only the poor and minorities will be stuck in the knowledge ghetto of the public school's 11th century technology.

Perelman is director of Project Learning 2001 at the Hudson Institute in Alexandria, Va.

9:45 P.M. Welcome. This is Guest Messaging. You received one call before you checked in. Message one: "John, this is Ted. They moved our meeting up to 8:30. I'm not sure where, yet. I'll call you in the morning to let you know." *10:00 P.M.* "I'd like a wake-up call for 6:00 A.M. And can you put a Do Not Disturb on my phone? Thanks." *10:06 P.M.* We're sorry, room service is now closed. You can place a breakfast order by pressing 3. "I'd like two eggs, over easy, with bacon. Make sure the bacon's crispy. Toast, lightly buttered. Freshly-squeezed orange juice. And coffee, black. To room 235 at 6:15 A.M." *6:00 A.M.* Good morning. This is

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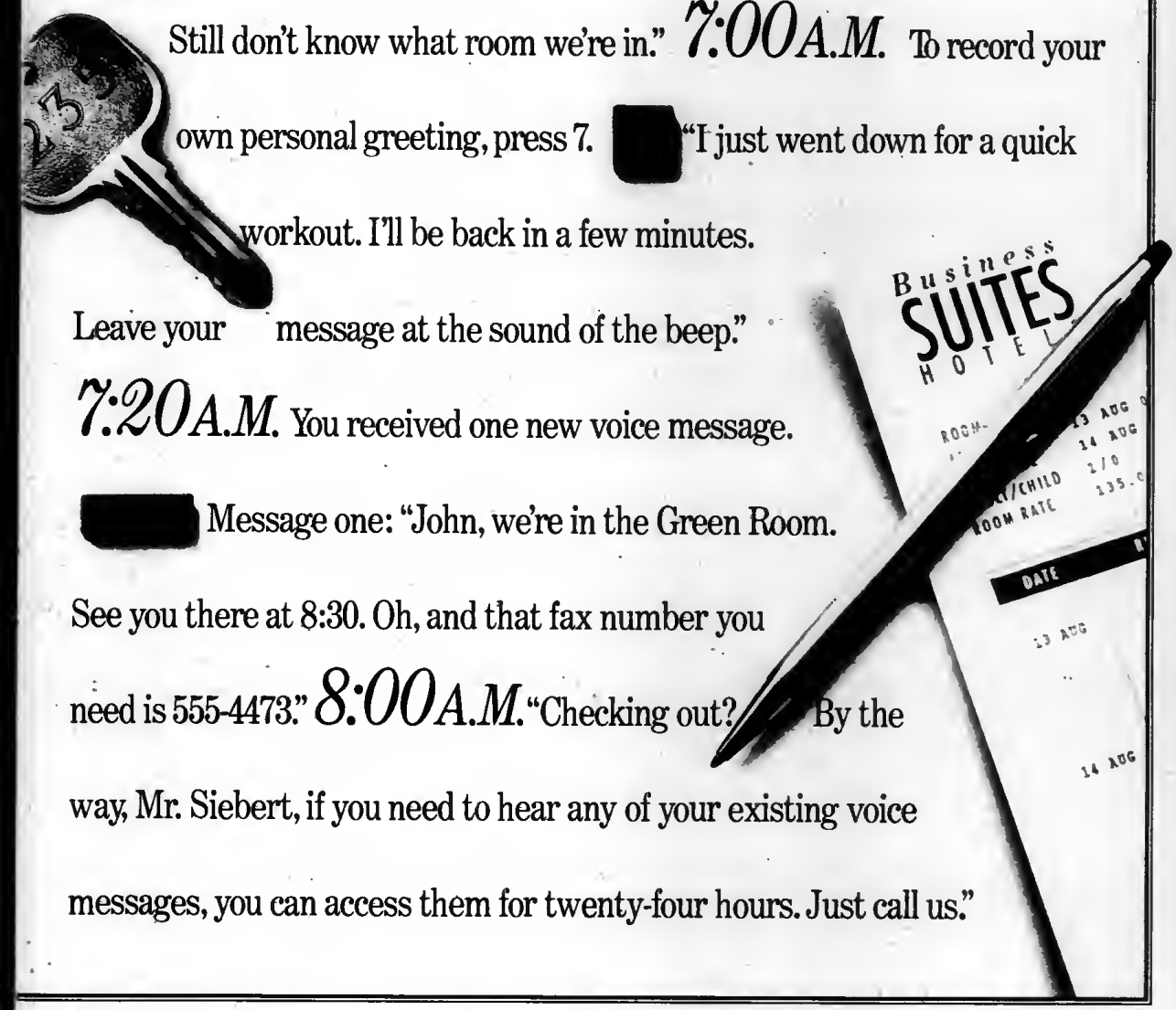

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In fact SQL/DS, like DB2, OS/2* Extended Edition Database Manager and OS/400* Database Manager, is a critical part of SAA™ and an outstanding relational database management system in its own right. Introduced in 1981 for VSE and in 1983 for VM, SQL/DS was the first commercial relational DBMS for IBM mainframes. Over the years, it has matured through three major versions. Consequently, SQL/DS has the industrial-strength features and high performance that have led numerous businesses—including manufacturers, newspapers, shipbuilders, hospitals and universities—to run their mission-critical applications with it. These customers have applications with large transaction volumes, or large databases having tables of over 70 million rows and hundreds of views, or thousands of users.

Let's take a look at what makes SQL/DS Version 3 the best DBMS for users of the VM and VSE operating systems.

Standards

In addition to the high performance and robust features that serious database applications require, SQL/DS has three features that are essential to implementing the most important information architecture of this decade—distributed computing. These features work together to provide an excellent environment for implementing distributed applications.

The first feature is SQL/DS's adherence to international standards for SQL as expressed by the American National Standards Institute (ANSI), the International Standards Organization (ISO) and the Federal Information Processing Standard (FIPS) 127.1. FIPS has created a test suite so vendors can measure how close they come to the SQL specification. Version 3 Release 2 of SQL/DS easily passes this test. SQL/DS even provides a "FIPS flagger" program to help users identify SQL statements failing to comply with the FIPS standard.

The second important feature is SQL/DS's participation in SAA connectivity using Advanced Program to Program Communication (APPC). This communication standard simplifies building cooperative processing applications with SQL/DS. In particular, APPC makes it easy to use SQL/DS as a database server in client server applications. In this style of distributed computing, the DBMS provides intelligent access to the data for client applications running on remote computers. These remote computers can be other mainframes, but more and more they are PCs with a graphical user interface such as OS/2 Presentation Manager.™

Not only do IBM's applications such as QMF use SQL/DS as a server, but third-party products are being used as front ends to SQL/DS to build applications. Independent software vendors are also attracted by the large installed base of SQL/DS users.

Distributed Data Bases

The third feature needed for effective distributed processing is support for distributed databases: the ability to access data at multiple sites, including locally, in a transparent fashion. One benefit of a distributed database is that local data can be retrieved without any network activity, thus reducing communications costs when compared with a centralized database at a single remote site. Another potential advantage is that each database node can be appropriately sized to the amount of data, the complexity of user requirements and the number of users. As the system grows, added demand can be met more easily than with a centralized system, by making smaller changes to existing nodes or by adding new nodes to the network.

SQL/DS's "remote unit of work" capability delivers these benefits by allowing a collection of database operations (called a unit of work) to retrieve and update data at a remote site. Future releases of SQL/DS will add support for "distributed unit of work," which allows a single unit of work to access data at multiple sites simultaneously.

Connectivity

Because companies often rely on a variety of operating environments, IBM is committed to extending distributed database functionality. Currently, remote data can be shared among VM SQL/DS databases, and IBM has announced data sharing between VM SQL/DS and DB2 databases. VSE Guest Sharing, using VM TSAF, provides access to local or remote VM SQL/DS databases to VSE users and applications running under VM. IBM intends to add interoperability with AIX,* OS/2 and OS/400 applications and databases as well.

SQL/DS delivers the three keys to implementing distributed processing—SQL standards, SAA connectivity and distributed databases. If you need to solve tough data management problems in a VM or VSE environment, SQL/DS is the obvious choice. Get in on the secret.

IBM®

COMMENTARY

Jerrold M. Grochow

Defining SAA terms

Recent articles about IBM's Systems Application Architecture have focused on the shortcomings of SAA rather than on what SAA compliance has to offer. So what does SAA compliance mean, and who is providing it? Will IBM tell you? If not, who will?

Let's start with a definition. Complying with SAA means the following:

- Using the languages and interfaces defined in the SAA Common Programming Interface.
- Developing user interfaces that follow the Common User Access (CUA) definition.
- Using architectural techniques to design your application program for cooperative processing.
- Using one or more of the included operating environments.
- Using communications mechanisms specified in SAA Common Communications Support.

SAA compliance, however, is not an all or nothing proposition. The answer to the question, "How much compliance is enough?" depends on who is asking the question. It also depends on who is listening to the answer. In fact, the entire

Continued on page 39

DEC's Ultrix strategy falls flat

Observers see failure to differentiate Ultrix from other Unix offerings

ANALYSIS

BY MAURA J. HARRINGTON
CW STAFF

In an effort to gain acceptance by the commercial Unix market, Digital Equipment Corp. has been aggressively selling Ultrix, its Unix-based operating system, as an "open systems" product that can run on several different platforms.

However, analysts concurred that although DEC's Ultrix product has shown overall improvement, the 6-month-old strategy to gain more of a share of the commercial Unix market has been unsuccessful for two reasons.

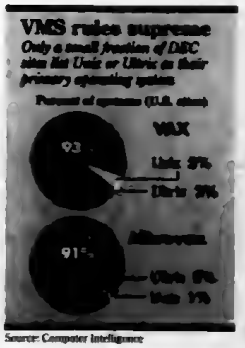
First, while Ultrix Version 4.0 now offers many of the same features other Unix platforms do, it has no outstanding features to differentiate the product. Second, it is ranked second to DEC's VMS operating system by the chairman and founder himself, Ken Olsen.

Unique streak

"The biggest problem DEC is faced with is the need to differentiate its Ultrix product from other Unix offerings," said Terry Shannon, an analyst at International Data Corp., based in Framingham, Mass.

DEC has attempted to convince users that Ultrix is a viable and competitive Unix product because it has more than 1,000 applications from independent software vendors and features that are accepted by the Open Software Foundation standards organization. Yet users are not listening very hard, according to analyst David Wu st S.G. Warburg & Co., an investment firm in New York.

"DEC has not been successful with its Ultrix product line, partly because when you have the founder of the company saying VMS is the best thing on the market, it's very hard to sell Ultrix — especially as an open system," Wu said.



Source: Computer Intelligence

Wayne Kernochan, an analyst in the Distributed Systems

Continued on page 36

Index, Ernst & Young join CASE bandwagon

BY ROSEMARY HAMILTON
CW STAFF

Those computer-aided software engineering (CASE) announcements just keep on coming.

Index Technology Corp. recently made its first move beyond the front-end design stage of CASE with the introduction of a re-engineering tool for Cobol systems.

Meanwhile, Ernst & Young is gearing up for its first move into the CASE market. It is scheduled to announce a consulting and methodology package called the Navigator Systems Series this week.

Index's XL/Recover is designed to review Cobol applications and provide help in both cleaning them up and bringing their data into an application development environment. The goal is to align existing programs with new ones so they can operate under the same structures and guidelines. The tool scans programs and then loads data and design information into the repository of Excelerator, Index's front-end software design tool. It also produces analysis reports of the programs so a user can pinpoint trouble spots.

One early user of XL/Recover is using the tool on a project that will merge applications from two operations into one. The U.S. division of Bertelsmann, a German media company, is creating one set of applications for both its book club and record club operations, which had functioned separately. This calls for both writing new programs when necessary and saving whatever software possible.

"We can see what already exists and what can be reused," said Everett Penn, a senior consultant at the U.S. division of Bertelsmann. "It also helps us identify what we don't have."

Information engineering

The Ernst & Young offering actually contains no CASE tools. The company has put together a package based on the information engineering methodology, which provides on-line guidelines, documentation and consulting services for software development. It is designed to support any product based on the information engineering methodology.

Ernst & Young has ties to Knowledgeware, Inc., which sells the Information Engineering Workbench. The Arthur Young portion of this accounting and consulting firm (the result of the merger of Arthur Young and Ernst & Whinney) provided start-up money for Knowledgeware, and Ernst & Young currently serves as a reseller of the Knowledgeware product overseas. But company officials insist that they will not promote Knowledgeware's product as the exclusive tool for the Navigator Systems series.

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Most CASE products only scratch the surface of your development problems.

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Fault-tolerance out, DEC in at the Amex

ON SITE

BY JOHANNA AMBROSIO
CW STAFF

At the American Stock Exchange, Inc., "buy low, sell high" is more than the age-old adage about how to play the market. The philosophy also applies to how information systems staffers are revamping the exchange's computer architecture.

The exchange is getting rid of its high-cost Stratus Computer, Inc. and Tandem Computers, Inc. systems and is bringing in relatively low-cost Digital Equipment Corp. machines instead.

"Why pay extra for fault tolerance?" said John Diesem, senior vice-president at the exchange. "Our sense is that fault tolerance provides you protection against the thing least likely to fail — the processing unit. The mean time between failures for mainframe hardware is extremely high, yet you're paying a premium for fault tolerance."

Diesem *updates Amex*

Diesem and his team handle all the systems on the exchange's trading floor. He is also working with the Securities Industry Automation Co. (SIAC) to develop and implement the new architecture. SIAC, which is owned by the American and New York stock exchanges, houses, maintains and programs the host computers used by both exchanges.

The overall goal, Diesem said, is to bring the exchange's architecture up to date to quickly respond to changing business needs. The exchange is, for example, exploring around-the-clock trading and recently received regulatory permission to offer new options for investors to bet on the direction of the Japanese stock market. The new computers will allow the exchange to handle these requests with much more flexibility, he said.

With the current systems, applications for routing orders, storing orders and reporting on completed orders are stored on a different host computer. The last computer in the chain is linked to the terminals and personal computers used by brokers on the exchange floor.

"Our current architecture is monolithic," Diesem said. "Each is very valuable and contains its own data. But if you lose any one because a communications line goes down . . . the whole chain goes down — all the way to the floor."

Instead of having hosts with huge applications, smaller machines will pinch-hit for each other in case of failure. The new computers will house the same applications, but the software will be broken down into small, easier-to-maintain modules that will run on specific machines.

That way, when the exchange adds a new product, only the application on a server, for example, may need to be rewritten. "The way things are now, we have to do major surgery on the big systems if we want to change anything," Diesem said.

At the top of the revamped architecture will be two DEC 6420s to house the Open Order File, which is a record of all the orders to buy or sell stock. Mirrored data sets will run the VMS operating system. Next will be multiple Decservers, also running VMS, to house specific applications. The final level will consist of terminals and Unix-based workstations on the trading floor. The computers will be connected via Ethernet.

Diesem said he could not specify when the swapping out would be complete. However, he said, "A lot of this will start to come together in '91."

Is there room for minis in client/server world?

ANALYSIS

BY SALLY CUSACK
CW STAFF

The client/server competition is heating up again, pitting midrange computer vendors against workstation companies and workstation companies against personal computer manufacturers. But exactly how or where does the traditional minicomputer fit into the world of the client/server computing environment?

Current data indicates that minicomputers are holding their ground, particularly in larger information systems shops. The Business Research Group (BRG) in Newton, Mass., recently surveyed 750 Fortune 1,000 companies and found that midrange computers are perceived as viable servers among that resource-rich community.

"The midrange market will definitely provide a place where companies can develop major client/server applications on that platform," said William Bluestein, an analyst at Forrester Research, Inc. in Cambridge, Mass.

According to Kevin O'Neill, vice-president of research at BRG, many of the sites surveyed indicated that a client/server strategy is simply one component of the larger issue of network integration.

"These companies want to retain the value of the systems they already have, and this results in better utilization of all types of computers," he noted.

The study also indicated that two-thirds of the sites were either using client/server functions or planning to implement them within the next 18 months.

Pete Johnson, manager of Texaco, Inc.'s Scientific Systems Management Unit in Houston, said the lines become "blurry" when defining the differences between high-end workstations and midrange computers. Texaco relies on a Cray Research, Inc. X-MP 2/16 to process compute-intensive data and uses a mix of Sun Microsystems, Inc. servers, IBM RISC System/6000s and Digital Equipment Corp. Microvax 3100s to process smaller data sets in an interactive environment. The company also services a sizeable PC community.

One thing that is very clear is that every midrange vendor — including IBM, DEC, Hewlett-Packard Co., Sun, Data General Corp., Wang Laboratories, Inc., Prime Computer, Inc. and Groupe Bull — has repositioned its product line to function in a client/server environment.

Adding value

Ultimately, their success will be determined by how and where they can add value, said Jim Hammons, an analyst at The Sierra Group, Inc. in Tempe, Ariz.

"They can't just relabel these systems, and the added value doesn't necessarily have to be in hardware. It can be in software and applications," Hammons said. He cites the Decstation 4000's extra I/O performance and HP's implementation of the New Wave environment on HP 3000 servers as examples of value-added systems.

While Bob Craig, IS manager at Genarra Sportswear, Inc. in Seattle, is not currently taking advantage of HP's New Wave technology, the company is using an HP 3000 Series 950 in a server capacity. The 950 communicates with two Novell, Inc. local-area networks, the company's distribution center and a facility in Hong Kong. When the computer was purchased in 1989, the intent was not to use it as a server. "It was just an evolutionary type of thing that brought us to that point," Craig said.

Many large-scale users plan to reconfigure their minis as servers as the necessary software becomes available or as individual corporate needs change. According to BRG, 29% of those sites currently implementing a client/server strategy are using mainframes, while 30% are using minis.

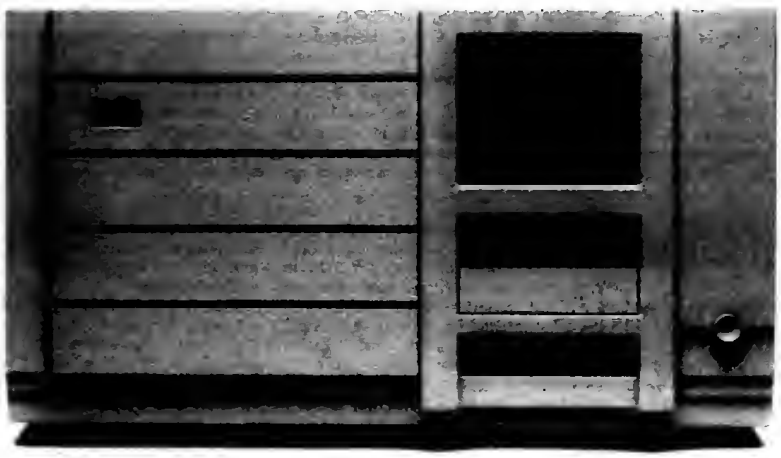
Jack Crawford, vice-president of information management at Hartford Insurance Group, a longtime Wang shop, said he is waiting for Wang to take Pace, its relational database management system, into a cooperative environment in a client/server-based architecture.

"It's a software-driven decision," Crawford said. Gerry Paul, vice-president of systems and communications at Wang, confirmed that the Pace version is being developed, but he would not specify a delivery date.

According to Bluestein, as the Unix operating system gains momentum, it better positions itself in the server world. "That's one of the reasons we feel companies like Sun will compete quite successfully as client/server providers," Bluestein said. "DEC will be there too, depending on how long it will take them to deliver an Ultrix-based server."

"The real issue for us is the software, not the hardware," Johnson said. "The three words around here are Unix, networking and X Windows." Johnson's staff is busy writing code in Unix to "X Window into" the PC environment, and he hypothesizes that someday the company will have a file server, database server and a local server all within the same network.

Here are 43 reasons why the new controller



They all add up to one very important reason. The new IDEA Concert lets you integrate more hosts upstream and more devices downstream than any other controller on the market. IBM mainframes, IBM midrange systems, DEC VAXs, asynchronous hosts, coax, twinax and ASCII devices, you name it. All work in concert, so you can maximize your investments and increase productivity. The IDEA Concert Controller. And now, we'll let the numbers speak for themselves.

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3. Talks to IBM System 3X midrange systems
4. Talks to DEC VAX systems
5. Talks to other asynchronous hosts
6. Talks to Unix hosts
7. Talks to multiple hosts (up to 4)
8. Talks to a combination of different host types
9. Talks to up to 56 coax devices
10. Talks to up to 42 twinax devices
11. Talks to up to 80 LAN devices
12. Talks to IBM 3270-type displays
13. Talks to IBM 5250-type displays
14. Talks to IBM InfoWindow displays

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Host System(s) Installed:	Quantity
☐ IBM 370 class mainframe	____
☐ IBM AS/400	____
☐ IBM System 3X	____
☐ DEC VAX	____
☐ Other Asynch Host	____

Name _____

Title _____

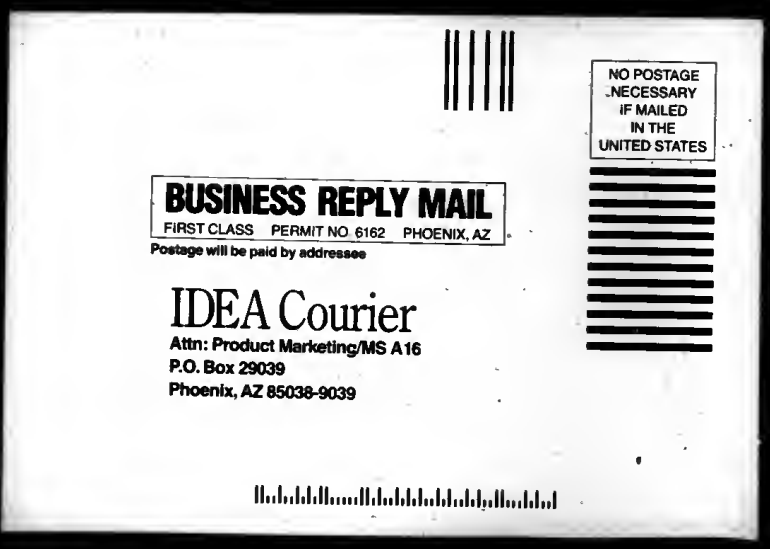
Company _____

Address _____

City, State, Zip _____

Phone _____

CW



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19. Talks to DECServer 200/550
20. Talks to IBM 3270-type printers
21. Talks to IBM 5250-type printers
22. Talks to IDEA 13000 series printers
23. Talks to IDEA 244 series printers
24. Talks to host-addressable PC printers
25. Talks to local devices
26. Talks to remote devices
27. Talks to a PC emulating a twinax terminal
28. Talks to a PC emulating a coax terminal
29. Talks to a PC emulating an ASCII terminal
30. Talks to Token Ring networks
31. Talks to DEC LAT networks
32. Talks to X.25 networks
33. Talks to IBM's AS/400 PC Support application
34. Talks to synchronous modems
35. Talks to SNA/SDLC environments
36. Talks to SAA compatible devices
37. Talks to IBM NetView
38. Talks to host as multiple logical units
39. Talks to IDEA Advanced Function Terminals
40. Talks to coax multiplexers
41. Talks to asynchronous multiplexers
42. Talks to concurrent gateway and downstream physical units
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Going on-line helps Connecticut manage environmental concerns

ON SITE

BY SALLY CUSACK
CW STAFF

HARTFORD, Conn. — Data center employees and engineers at Connecticut's Department of Environmental Protection (DEP) are busy these days creating and maintaining an on-line Environmental Information System for use by the department's Bureau of Air Management.

Air quality control within the unit is a round-the-clock job. The unit is responsible for 30 remote sites that continually monitor the level of air pollutants. It also serves in a watchdog capacity for several in-state facilities by constantly evaluating factory emissions and the quality of air.

"These sites will eventually have systems that will automatically dial into our computer if there is a problem," said Richard J. Soj, senior technical systems analyst at the DEP. "We are working on a system that will allow our computer to interrogate their CPUs for data, if indeed that becomes necessary."

Depending on the reported results, such as if a pollutant reaches an alarming level, "they will send a computerized file here telling us that this is the problem, here is the level, and we determine then what, if any, action should be taken," Soj said.

The department currently has three bureaus dedicated to monitoring air, water and waste pollutants, and all three rely on Data General Corp. MV systems to process information and applications. The DEP is also responsible for issuing permits and maintaining historical data on facilities and incidents that fall under its jurisdiction.

The new Environmental Information System consists of a set of integrated software components designed to run on the Air Compliance Unit's DG MV/10000 and MV/15000 and MV/20000 minicomputer systems. The computers are linked together via DG's Xodiac networking system, and all are running DG's AOS/VS operating system. The system project is being developed in-house.

Describing the application as an evolutionary, ongoing development effort, Soj and his staff have divided the software into three major components: administrative, comprising newly established registration and permit fee programs and a purchase request/budget operations system; air quality, which includes data acquisition and air quality data handling subsystems; and the technical component, with 13 subsystems, including programs for complaint tracking, inspection tracking and the continuous emissions monitoring subsystem. There are also subsystems for toxic air pollutant retrieval and enforcement control.

The Environmental Information System was written using a suite of programs and applications from SAS Institute, Inc., a Cary, N.C.-based software corporation. Known for its statistical programs, the SAS product line has expanded to include sophisticated graphics, data handling and data management systems.

> IF A POLLUTANT reaches an alarming level, "they will send a computerized file here telling us that this is the problem . . . and we determine then what, if any, action should be taken."
>
> RICHARD J. SOJ
> CONNECTICUT DEP

The Bureau of Air Management is implementing several of these systems to construct the environmental software. A unique feature of the product, Soj said, is its ability to merge all files and subsystems.

"The SAS program allows us, in five or six statements, to merge data sets and produce a report," he said, adding that the ability to produce timely reports is a requisite for any government agency. "All systems have been assigned a unique identifier such as client, sequence, town, and premise number, which allows bureau engineers to create any number of data files containing specifically requested information from any combination of subsystems." All data storage, management and analysis is done by the SAS system, Soj said.

Most of the 128 staff members are engineers and technicians, the people responsible for designing, implementing and maintaining the software project. The system will be expanded as needs dictate, Soj said, and the department is currently writing an interrogation and polling software program to be used in continuous emissions monitoring.

The DEP is also investigating the possibility of arming inspectors with laptops for on-line data entry and on-site testing. Soj said the department has a DG Aviion workstation that "we are planning to use for GIS applications."

How Long Will You Have To Wait For VSE/ESA Software Solutions?

Sybase lessens mainframe load

BY JEAN S. BOZMAN
CW STAFF

EMERYVILLE, Calif. — Users of Sybase, Inc.'s new IBM mainframe connectivity products said they are using the software to gain real-time updates from IBM hosts rather than batch updates, which typically occur overnight.

The latest generation of Sybase mainframe products provides connections through IBM's LU6.2 protocol to IBM's CICS teleprocessing monitor. The result can truly be called cooperative processing — a system in which the personal computer local-area network takes some of the heavy number crunching away from the IBM mainframe, beta-test site users said.

"IBM's VSAM is an efficient file structure," noted Dave Alessandro, a project manager at Textron Financial Corp. in Providence, R.I. "But you're losing [mainframe] cycles accessing the VSAM files. Now we're bringing the host data down to the LAN and moving toward eliminating duplication of functions." Sybase's products are slated to ship to new customers by year's end.

Textron developers are working on a pilot project that would take data from IBM's VSAM and DB2, residing on Textron's IBM 3090 mainframe in Irvine, Calif., and place it on a PC LAN running under Microsoft Corp.'s LAN Manager. Textron is using Sybase's Open Server for CICS to access MVS applications and the Sybase Open Gateway to provide SQL access to DB2 data. An IBM RT running AIX acts as the gateway on the PC LAN. However, the workstations are IBM Personal System/2s or clones running OS/2.

Taking time out

True distributed processing will not follow immediately, Alessandro said. "We don't want to jump into a truly distributed application until we can get a feel for this technology."

The beta-test site users said Sybase had solved both connectivity and communications problems with its IBM-compatible software. "You can have an application that thinks it's talking to the Sybase Open Server, and the Sybase software will take on the job of turning s Sybase task into a DB2 task," said Jim Stoddard, senior vice-president for strategic systems at Fidelity Investments in Boston.

Fidelity plans to continue to do much of its high-speed transaction processing on the IBM host, while presenting the results to users on desktop machines. "Most other DBMS products want you to move all of your data into their database," Stoddard said. "Sybase is saying that you can move part of your application into Sybase, then go through the [Sybase] Open Server so that you won't have to change your older, host-based applications."

Ultrix

CONTINUED FROM PAGE 29

Division at Boston-based The Yankee Group, agreed. "Ultrix has, in some ways, always been a product that was looked at as secondary to [DEC's] VMS operating system," Kernochan said.

While DEC's Ultrix marketing director, Joe Menard, acknowledged that VMS is the dominant system DEC ships today, he said, "We're seeing a lot of VMS customers moving to Ultrix since we started shipping last April."

However, Kernochan said that Ultrix's growth remains stunted because it is being pulled in too many directions.

In addition to DEC's internal forces pulling Ultrix toward its proprietary platform, it is also being pulled toward becoming an OSF standard, because of its Motif user interface, and toward Unix International, because of the organization's security requirements and popular kernel.

However, because of an industry dispute between Unix International and the OSF, each organization uses a different user interface.

Tying them together

"We can't be bothered with multiple user interfaces . . . and that has been s sore spot for the people around here, because ideally, we'd like to run all of our applications under one common user interface, and right now we can't," said Ultrix user Jim D'Aquino at the Union Bank of Switzerland Securities, Inc.

D'Aquino, who is upgrading to Ultrix Version 4.0, said that the bank's most popular spreadsheet, Lotus Development Corp.'s 1-2-3, doesn't run on Ultrix.

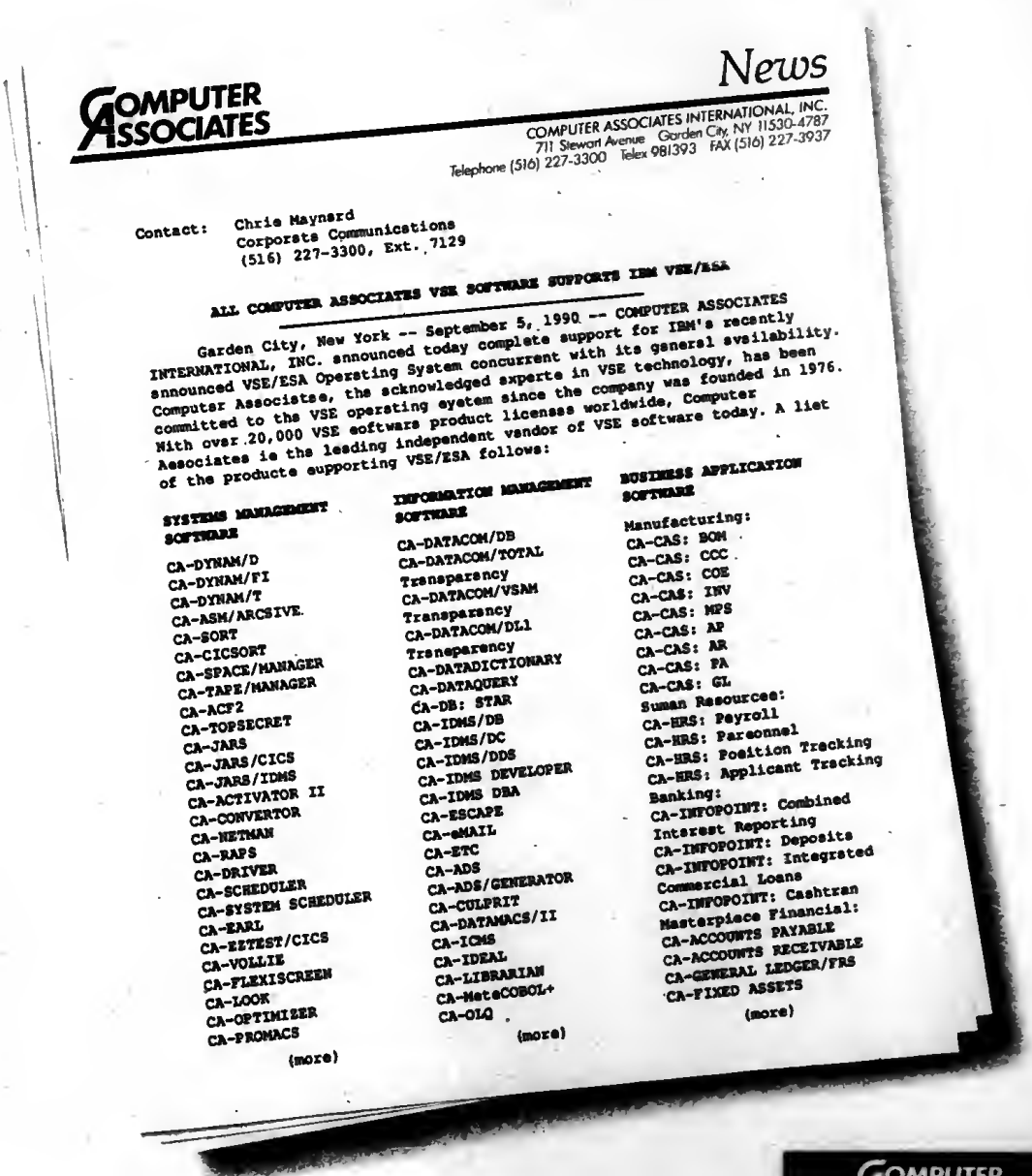
"We've raised hell about that to DEC, but it's sort of fallen on deaf ears," D'Aquino said, adding that 1-2-3 does, however, run under the VMS platform, and DEC said it will not be marketing an Ultrix version for another six to 12 months.

Despite the ongoing standards issue, Wu said DEC is being held back from becoming s serious player in the Unix world for other reasons as well. "I don't think DEC's salespeople really understand Unix . . . their sales staff isn't that good, and their marketing strategy isn't good either," Wu said.

Menard disagreed, claiming that DEC spent "a considerable amount of time and money in training the sales staff."

"If you look a few years back, we basically sold Unix to those who wanted it, but we didn't go out of our way. Now we are going after the Unix market agressively," Menard said.

Now, That Didn't Take Long Did It.



COMPUTER ASSOCIATES *News*

COMPUTER ASSOCIATES INTERNATIONAL, INC.
711 Stewart Avenue Garden City, NY 11530-4787
Telephone (516) 227-3300 Telex 981393 FAX (516) 227-3937

Contact: Chris Maynard
Corporate Communications
(516) 227-3300, Ext. 7129

ALL COMPUTER ASSOCIATES VSE SOFTWARE SUPPORTS IBM VSE/ESA

Garden City, New York -- September 5, 1990 -- COMPUTER ASSOCIATES INTERNATIONAL, INC. announced today complete support for IBM's recently announced VSE/ESA Operating System concurrent with its general availability. Computer Associates, the acknowledged experts in VSE technology, has been committed to the VSE operating system since the company was founded in 1976. With over 20,000 VSE software product licenses worldwide, Computer Associates is the leading independent vendor of VSE software today. A list of the products supporting VSE/ESA follows:

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CA-JARS/IDMS
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CA-DRIVER
CA-SCHEDULER
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CA-PROMACS

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CA-IDEAL
CA-LIBRARIAN
CA-MeteCOBOL+
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CA-INFOPOINT: Deposits
CA-INFOPOINT: Integrated Commercial Loans
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COMPUTER ASSOCIATES

Lincoln finds systems success designing for 70% of its users

ON SITE

BY MICHAEL FITZGERALD
CW STAFF

FORT WAYNE, Ind. — At Lincoln National Corp., the nation's seventh-largest insurance holding company, 11 years of automating its offices have turned the information systems staff into proponents of the 70% solution.

Lincoln has seen its Office Productivity Network (OPN) — installed in 1979 and expanded throughout the years — grow to support more than 6,000 users, far outstripping its original expectations of 500 to 1,000. Even the custodial department is hooked into OPN, which now has its own network of 10 of Lincoln's 20 Prime Computer, Inc. systems, including 6450 and 6650 minicomputers.

The company has come to be used as a test lab of sorts for Lincoln National Information Services, Inc. (LNIS), a Lincoln subsidiary created in 1983, both because there was not much competition at the time, and because selling the system helps cover development costs.

For example, Lincoln will serve as a test ground for LNIS' latest upgrade, a major revision of OPN that emulates a graphical user interface on the dumb terminal system, providing windowing and pull-down menus. LNIS expects to have this fully implemented within the company by sometime in 1991.

Secrets of success

Lincoln has learned how to make a system user-friendly by setting its sights on a 70% success standard. "We found that only about 15% of the knowledge workers in the office would ever really master any of the products," such as spreadsheets or desktop publishing packages, said James Tunis, who helped start OPN and has run LNIS since the subsidiary was created in 1983. "At the other end, there's another 15% that we call the Luddites, who are just never going to touch anything."

That leaves about 70% of the people, who are what Tunis calls "technology indifferent." These people, Tunis said, will use technology when "it'll do the job for them; they don't have to read a manual or go to a class; and when they need it 10 minutes from now, they can get it."

Tunis said most software ignores the needs of these users, who are the bulk of the corporation: "It has to be PHD [Push Here, Dummy] or something that really gets them going easily without having to dig through a manual."

For instance, Lincoln has created a desktop publishing package it has called OPN:Style. The package automatically prepares text in a variety of formats. Tunis said it has eliminated the "ransom note" school of design — the use of too many fonts and type sizes in one document — and cut the costs of hardware, desktop publishing software and training.

The initial incentives for creating the OPN came from Chief Executive Officer Ian Rolland's desire to reduce paper flow and advance end-user computing. Rolland's continued support and use — he even has a terminal at home — and that of other top executives has helped the system succeed. Primarily, though, users drive the success of OPN.

Executives credit the system with making a qualitative change in the way the company does business. For instance, since the law department installed OPN, it has been able to handle 30% more cases with 8% (two employees) fewer staff. Internal surveys showed that workers with OPN rate themselves from 12% to more than 20% more efficient than without it.

Electronic mail is the main selling point for OPN within Lincoln, but users generally find its document management abilities attractive as well. The system, for instance, will automatically arrange meetings. It also keeps records of where E-mail goes, so users can tell whether requests have been passed on to other employees, which can help prevent bottlenecks.

Tunis wants 70% success

Lincoln wants to make the system broader. Among current projects are creating modules that will do purchase orders electronically as well as bringing optical character recognition and imaging technologies into OPN.

LNIS recently implemented an IBM RISC System/6000 version of the system for a customer but has no plans to move off of the Primes internally — at least not until the Unix world "grows up" with more powerful machines, Tunis said. He said he does favor Unix over OS/2 for a multiuser, multitasking environment.

Tunis said that using the proprietary Prime system with terminals is inexpensive and much easier to connect to than a client/server environment.

Grochow

CONTINUED FROM PAGE 29

issue of compliance may need to be treated on several different levels, from concepts down to specific rules and standards.

Software vendors play a very important role in implementing IBM's SAA strategy. Forward-thinking software vendors are already moving toward common user interfaces across multiple applications and common software across multiple platforms. The support and compliance of vendors has added legitimacy to IBM's strategic direction and to pursuing improved productivity and quality via better software architecture."

It is important to remember the following:

- Vendors will all claim SAA compliance — some long before they actually have it.
- There will be fairly wide variations in how different vendors interpret "complying with CUA."
- Cooperative processing will begin with workstation front ends to previously existing mainframe applications; distributed databases will be in second or third releases.
- Non-SAA languages will be phased out slowly since few, if any, vendors will rewrite older software until they really must.

How can you tell if software is SAA-compliant? IBM publishes a "Guide for Evaluating Applications" to help you in verifying SAA compliance. This manual supplies a checklist of the major components of SAA. Anyone developing software can check off those features of the SAA definition that are used in their applications.

Like most checklists, this provides only a superficial view of how the application is implemented. It does not show what non-SAA software or standards are also used, nor does it indicate how much of an application uses the standard. If one set of queries uses SQL, but the rest of the application is written in assembler, does that make it SAA-compliant (i.e., allow you to check the box)?

IBM is leaving it up to software vendors and developers to determine if and how specific software conforms to SAA. This puts a significant burden on software developers and users to understand the issues underlying compliance and insist on it when it is important.

IBM is also publishing a catalog of current and announced products that comply with SAA. The first edition of this catalog will include applications that support SAA as to application structure, environment and CUA.

Future versions of the catalog are likely to require adherence to CPI and CCS components of SAA as well.

Listing in the SAA catalog permits a vendor to specify "registered in IBM's SAA catalog" in advertising and on the products themselves. However, only the vendor makes the judgment as to whether a product follows SAA guidelines in a particular area. IBM reviews requests for catalog listings but not the actual software and presumably catches only blatant misrepresentations.

If IBM takes a generally passive role in enforcing SAA compliance, does this mean that SAA will devolve into chaos? Probably not.

What SAA is really about is productivity and quality. It is less an issue of strict compliance with rules and standards for their own sake than an issue of what we can expect as a result of complying with them.

Underlying the whole SAA approach is a belief that productivity of developers and users will improve when we use standard approaches to implementing systems and delivering their functions. There is also the belief that the quality of our work, measured in every way from number of errors to customer satisfaction, will improve from the use of these same standards. As SAA demonstrates its ability to create these improvements, the marketplace will police the level of SAA conformance.

We are all in this together — IBM, other hardware manufacturers, independent software vendors and computer user organizations — so the more we can agree on a set of standards that all can use, the more we will all come out winners.

Grochow is vice-president of the Corporate Technology Group at American Management Systems, Inc. in Arlington, Va.

NEW DEALS

TRW to supply Amoco imaging

Amoco Oil Co. has chosen **TRW Financial Systems, Inc.** of Berkeley, Calif., to supply Amoco's customer service center with an advanced document image processing system. The Customer Service Image System, which will process customer correspondence and provide on-line access to statements, is the second phase of a project begun in 1989.

Digital Equipment Corp. will install a $2.7 million campuswide information network at **Oakland University** in suburban Detroit. Two DEC VAX 6000s will be used for academic computing; a reduced instruction set computing-based Decsystem 5810 is earmarked for research studies; and 70 DEC workstations and personal computers will be installed in the PC laboratory and campus library.

NEW PRODUCTS — SOFTWARE

Applications packages

DK Systems, Inc. has announced a Wang Laboratories, Inc. VS-based on-line user support and call tracking system.

DK Help Desk is a Wang Laboratories, Inc. PACE application that can be used as a stand-alone unit or with DK Inventory Manager, a hardware- and software-equipped tracking system. The product allows multiple-response entries to be made against particular Help Desk calls.

The product is priced at $5,000 for a stand-alone version and $2,500 when purchased as an integrated package with DK Inventory Manager.

DK Systems
1455 N. Sandburg Terrace
Chicago, Ill. 60610
(312) 943-7744

IMSL, Inc. has introduced Exponent Graphics System, a software package designed to meet the programming demands of scientists and engineers who solve problems with Fortran.

The product provides three levels of functionality: low-level subroutines, advanced subroutines and applications-level routines.

The product runs on Sun Microsystems, Inc. 3 and 4 systems, Digital Equipment Corp. VAX 9000, 5400, 5800 and Decstation machines. Prices range from $1,500 to $15,000, depending on type of platform.

IMSL
2500 Permian Tower
2500 City West Blvd.
Houston, Texas 77042
(713) 782-6060

Utilities

R.R. Software, Inc. has announced that Pastran, its Pascal-to-Ada translator, has been made available for Digital Equipment Corp. VAX platforms.

The product will directly translate DEC Pascal to Ada with up to 95% efficiency, the vendor said. Pricing is based on the numbers of Pascal lines to be translated in increments of 50,000. Up to 250,000 lines cost $10,000 per increment; more than 250,000 lines cost $5,000 per increment.

R.R. Software
P.O. Box 1512
Madison, Wisc. 53701
(800) 722-3248

Beacon Software International, a division of Interleave Technology, Inc., has announced the CICS Connection, an IBM mainframe software product designed to extend the file-sharing ability of VSAM.

The product enables users of multiple on-line and batch programs to update the same VSAM files simultaneously without compromising any data. It features automatic field-level journaling of updates, which enables users to back out changes from VSAM files while they remain on-line, the vendor said.

CICS Connection runs on IBM mainframes under MVS/SP, MVS/XA, MVS/ESA or CICS Version 1.6.1 or higher. It is priced at $45,000 per site.

Beacon Software
50 Milk St.
Boston, Mass. 02109
(617) 482-1778

Main Frame Software Products Corp. has announced Release 4.0 of Help/Key, an IBM Systems Application Architecture/Common User Access-compliant help system designed for users of VSE and MVS/CICS systems.

The product supports IBM's DB2 and IMS and includes an automatic scanning feature that searches single- or multiple-page screens.

Perpetual license fees range from $9,900 to $13,900.

Main Frame Software Products
135 Glen Road
Wellesley, Mass. 02181
(617) 239-0288

System software

Highland Research, Inc. has announced Release 1.2 of Critique VTAM, its VTAM performance management software package.

The product can be used to monitor VTAM areas such as configuration, storage, application, session, routing and I/O. It can also be used to find VTAM problems before users do and then isolate the cause of these errors, the vendor said.

Pricing ranges from $9,000 to $25,000, depending on CPU size.

Highland Research
120 Summit Pkwy.
Birmingham, Ala. 35209
(205) 942-6590

Compilers

Data General Corp. has announced a native-code compiler designed for Aviion reduced instruction set computing-based servers and workstations.

The GNU C++ compiler is based on AT&T C++ Version 2.0. GNU C++ is a component of the GNU software platform from the Free Software Foundation.

A package that comprises GNU C++, a GNU debugger known as GDB and AT&T 2.0 C++ libraries is priced at $1,595.

Data General
3400 Computer Drive
Westboro, Mass. 01580
(508) 898-4051

NEW PRODUCTS — HARDWARE

I/O devices

Everex Systems, Inc. has announced an Intel Corp. I486-based file server that includes 32M bytes of 32-bit memory.

Stepserver 486/33 was designed to accommodate several users on a Novell, Inc. network. It operates at 16.5-MHz I/O bus speed and includes an intelligent small computer systems interface controller. The product is priced at $13,498.

Everex Systems
48431 Milmont Drive
Fremont, Calif. 94538
(415) 498-1111

Human Designed Systems, Inc. has announced a second generation of its Viewstation series of X Window System terminals.

The Viewstation Plus series of terminals is reportedly equipped with as much as 10M bytes of memory and features screen sizes ranging from 14 to 21 in. The terminals also feature 256-color, grey-scale or monochrome display capabilities.

Pricing ranges from $1,999 to $5,999, depending on type of model.

Human Designed Systems
421E Feheley Drive
King of Prussia, Pa. 19406
(215) 277-8300

Oce Graphics USA, Inc. has introduced two 406 by 406 dot/in. raster plotters designed to produce maximum monochrome outputs of 1 in./sec. on paper or film.

Models G9844 and G9845 of the Oce G9800 series of direct imaging plotters include a 20M-byte hard drive and a 3½-in. floppy disk drive.

Model G9844 ($20,990) produces D-size architectural plots in approximately 30 sec., and Model G9845 ($23,990) produces E-size architectural outputs in about 45 sec., the vendor said.

Oce Graphics USA
P.O. Box 7169
385 Ravendale Drive
Mountain View, Calif. 94039
(415) 964-7900

Oce Graphics' ***G9800 raster plotters***

Processors

Tektronix, Inc. has introduced a reduced instruction set computing-based multiprocessing server designed for visualization applications.

The XD88/700 can operate as a file or compute server in heterogeneous environments. It features scalable computer architecture and consists of two basic configurations: the XD88/720 ($62,000), which features a dual-processor, 25-MHz Motorola, Inc. 88100 processor rated at 67 million instructions per second (MIPS), and the quad-processor XD88/740 ($102,000), which delivers 120 MIPS.

Tektronix
P.O. Box 1000
Wilsonville Industrial Park
Wilsonville, Ore. 97070
(503) 685-2838

Power supplies

Current Technology, Inc. has announced its Plus series of power protection products for retail, point-of-sale and other small system environments.

The series was designed to protect point-of-sale registers, scanners, teller terminals, personal computers, facsimile machines and photocopiers from power surges, lightning and line noise. Surges are filtered before they reach any equipment, thereby preventing errors, avoiding the loss of data and obviating the need for system reboots, the vendor said.

Other features include noise suppression of more than 35 dB and 20,000-amp surge capability. The series of products are priced at $169 each.

Current Technology
1400 S. Sherman
Richardson, Texas 75081
(214) 238-5300

Data storage

Unisys Corp. has announced a cache disk storage subsystem for its 1100/2200 line of mainframe computers.

The M9740 supports 16M to 64M bytes of cache memory and features a disk storage capacity of 32G bytes. It supports industry-standard Block Multiplexer Channel or Unisys Word Channel I/O. The product is equipped with a dual-control unit that supports four separate mainframe host interfaces and can also be configured to accommodate up to eight host interfaces, the vendor said.

The product is priced at $275,707 or $762,355, depending on configuration.

Unisys
P.O. Box 500
Blue Bell, Pa. 19424
(215) 986-5367

Ten of Europe's toughest critics awarded Wyse their top prize.

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Hannover, Germany, 1990: European experts judging at CeBIT, the world's largest computer exposition, give their top design award to the Wyse PC Model 3225.

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COMMENTARY

J.A. Savage

Open Look, closed mind

Sun executives like to trip over the word Motif, pretending that their tongues are tied when it comes to the opposing product to Sun's Open Look graphical user interface.

Motif, supported by the Open Software Foundation, apparently represents more to Sun than mere competition. It represents The Old Entrenched Big Boys (and, presumably, Big Girls) in the computer industry — everything that Sun loves to hate.

Sun has resisted Motif, although other vendors, notably IBM, HP and DEC, have embraced it. Instead, Sun continues to insist its Open Look will become the graphical interface standard.

The Open Look graphical user interface was designed by Sun with the help of AT&T and Xerox. Motif was largely developed by HP and is supported by IBM and DEC. Motif is based on Presentation Manager and OS/2 but will also work with Unix. Open Look is solely for Unix.

"It's not a question of backing down on Motif," Sun marketing executive Ed Zander says. "Our fundamental problem is with DEC and IBM, the forces

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Dbase users cautiously content

BY JAMES DALY
CW STAFF

Early assessors of Ashton-Tate Corp.'s Dbase IV Version 1.1 database software package give it a thumbs up but say they will keep one eye on the offerings of the up-and-coming vendors who slipped into the vacuum after an earlier, buggier version of Dbase damaged Ashton-Tate's profits and reputation.

"They did exactly the right thing with this fix, and I'd like to see them stay ahead of the game, but I'm keeping my options open," said Pat Adams, president of DB Unlimited, a consulting firm in Brooklyn, N.Y. "My loyalty is to my business and my clients, not to any particular company."

Longtime Ashton-Tate users generally hung tough with the company throughout the ordeal, which began nearly two years ago. Dbase IV Version 1.0 was a failure of monumental proportions because of a faulty memory management program that caused the application to crash spontaneously.

In late July, the Torrance, Calif.-based company pulled the curtain back on Dbase IV Version 1.1. In the interim, however, some users headed over to products such as Fox Software, Inc.'s Foxbase or stayed with Ashton-Tate's preceding generation, Dbase III Plus.

Competitors said the Version 1.0 debacle rewrote some of the rules in the database market. "Before the problems with 1.0, people were less willing to sign on with the smaller companies," said Michael Gardner, vice-president of research and development at Wordtech Systems, Inc. in Orinda, Calif. "But that's changed in the past 18 months."

Those who stuck with Ashton-Tate said Version 1.1 is much quicker and more reliable than 1.0 but could still use some sprucing up. Barbs were directed toward Version 1.1's menuing system, which one user described as "pretty bare-bones." The major complaint: Users need to write a lot of code to create elaborate menus.

Jack Bradford, a systems supervisor at the Minnesota Department of Natural Resources in Minneapolis, was able to work around the bugs in Version 1.0 but said he would still like more windowing and mouse support in

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FEATURE: PC PURCHASING CONTROL

PC buying power: Who has it?

BY RICHARD PASTORE
CW STAFF

"This is the PC I want. Just sign the check, and I'll go get it." End users may wish it was that simple to obtain new personal computers, but such orders typically fall on deaf information systems ears.

Despite the purported trend to distribute IS responsibilities to end users, few IS groups seem to be relinquishing control over PC purchases. Indeed, some IS departments have only recently wrested control from end users, ringing down the curtain on what they called an unmanageable menagerie of motley machines too confusing and costly to maintain.

"What I inherited here two years ago was very difficult to control,"

Jamie Hogan

says Claude Rankin, manager of MIS at the New York office of Deloitte Touche. It was a multivendor free-for-all, Rankin says of the users' former buying patterns.

He has since instituted a steering committee made up of key partners of the firm and himself. At least once a year, this group gathers to evaluate and predict users' hardware needs.

"We look at the historical events of the past 12 months and how we've been doing," Rankin says. If the committee identifies a need for more processing power, it will set aside a percentage of the budget for PC upgrade purchases, and those purchases can only be placed with vendors appearing on Rankin's approved brand list.

"It makes it possible to have greater control over your inven-

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Many businesses are already getting a competitive edge with AT&T ISDN.

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COMMENTARY

Douglas Barney

A handle on multimedia

Do you know what a gen lock is? How about SMPTE time code or a single-frame recorder? If, like most normal people, you haven't a clue and don't give a hoot, then you are far from ready for multimedia.

Bored with the drudgery of spreadsheets and fed up with fonts, it seems that most people today think they want multimedia. Its sheer hype has taken care of that. But all that fun masks an important fact: True multimedia creation is complex and difficult. It assumes all the complexity of the individual components — sound, video, graphics and animation — and adds the difficulties of blending these elements into a cohesive whole. That doesn't sound like fun, and managing it all may be worse.

Clearly, an information systems group that is up to its ears downsizing and chipping away at applications backlogs has no time to explore the wonders of desktop video and perfect the fine arts of rotoscoping and motion blurring that make animations effective. Most people in IS have no idea what any of this weird stuff is. Should IS start animating, digitizing video and syncing sound? Of course not. That requires artistic talent, creativity and technical expertise.

Despite the daunting complexity, IS should not sit idly by while the multimedia jugger-

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Right at the user's fingertips

National Semi's 1-2-3 link to host databases automates analysis

ON SITE

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — A mainframe-based spreadsheet initially designed for National Semiconductor Corp.'s Asia Pacific Operations is expected to enable users companywide to automate what was once an inflexible, manual system of comparing sales and manufacturing data.

Previously, this data was available only in canned, paper reports for manual side-by-side comparisons. Consequently, it was very difficult for the Singapore-based division to quickly massage the data, never mind compare it or view it from various angles. The canned approach also led to the production of unnecessary reports that left users with mountains of data to sift through.

"They wanted to be able to have graphics and manipulation of data on-line, at their fingertips," said Katharine Nickey, an information center end-user support staffer.

Along with her supervisor, Judy Armstrong, Nickey has built and is still beta testing a mainframe-based database. The Manufacturing Data Base (MDB) system is currently being tested by a handful of users in the Asia Pacific subsidiary.

Free time

According to the Asia Pacific staff, the MDB system will free up time that was dedicated to the weekly summarizing process and the feeding of results into an electronic mail system.

Because the paper-based reports were fed with data from four mainframe-based databases, it would seem only natural for National Semi, which was already a heavy user of Lotus Development Corp.'s 1-2-3 spreadsheet across numerous platforms, to turn to the IBM mainframe version, 1-2-3/M. After all, 1-2-3 threads its way through the chip maker's facilities on personal computers — both DOS- and OS/2-based — Digital Equipment Corp. VAXs, Unix hosts and MVS mainframes. "We can put a file on any platform and without any conversion, it works just fine," Nickey said.

Yet at first, Nickey's team considered a mainframe database built around Information Builder's Focus-based applications.

While Focus does play a large part in extracting information and building reports, which are then pulled into Lotus spreadsheets, Nickey's team decided it wanted a more flexible user interface than Focus could provide.

"We had such a wide user base of Lotus that [we knew] the interface would be comfortable and familiar to someone on a mainframe," Nickey said. Users can also continue to rely upon Lotus commands rather than learn the Focus language.

Also aiding the comfort factor was 1-2-3/M's Worksheet Window Perspective Mode, which allows users to split the screen to view two or three different reports simultaneously.

In the end, Nickey's team built a custom-developed 1-2-3/M menu that allows users to choose reports and pull data directly into 1-2-3 spreadsheets for analysis and manipulation on-line.

The MDB system extracts data from cascading databases.

Andy Freeberg

1-2-3/M *gave Nickey flexibility*

At the top of the pyramid are four mainframe-based databases created from Information Builder's Focus language. The host hardware is NAS 9080s running IBM's VM operating system and related software.

"Using linking commands from within VM's CMS program, we're extracting data out of corporate databases and then creating smaller databases, which contain the information we really use," Nickey explained. At that point, Focus programs extract the information necessary to produce the requested reports, which can be output to Lotus PRN files. Each PRN file, totaling as many as a few hundred, provides a different view of the raw data.

Those reports are fed into 1-2-3/M, where they become accessible to a range of desktops, including ASCII terminals, graphics terminals and PCs.

From here, users can execute a macro that taps into templates that provide predetermined views of the data or different views of the same report. There is a template file for each PRN file. This allows users to massage the information on-line and produce a report that meets their needs.

A macro menu presents users with a choice of seven different types of performance measurements. Once a selection is made, they are presented with other choices, such as data by locale, customer or product line.

"Each time they choose one, a spreadsheet is loaded into workstation memory, although it's really still on the mainframe. Then they can go in and choose the report they want," Nickey said.

Each choice loads more spreadsheets into memory — up to 256 sheets.

"You can page back and forth looking at the reports using function keys, download files to the PC, graph the information and print it out," she added.

Unless it is copied to the A disk, all this data disappears from memory when the user logs off.

Group accounts will provide access to a 1-2-3/M file server, from which data and reports can be viewed and customized.

Barney

CONTINUED FROM PAGE 45

naut moves past. Those in IS should strive to understand the basics of multimedia; otherwise, these systems can get as out of hand as the early days of corporate personal computers.

As is often the case, it will be up to IS to deflate the hype that says multimedia is for everyone and will simply drop from the sky onto millions of desks. That's nice for firms trying to sell expensive hardware, but it ain't how it's going to happen.

IS will pull in the reins a bit and define what this technology will be used for, as well as who will implement and support it. These are questions that hawkers of multimedia have utterly failed to answer. In doing so, IS will fulfill its lesser but more important uses — you know, real things like training and corporate presentations, those sorts of things.

One thing the vendors generally fail to tell users is that there are different types of multimedia. There are multimedia applications that a user simply runs. These are the kiosks seen at airports or the compact disc/read-only memory applications bought in the store.

This is the easy part. All you need is a machine powerful enough to support the application, and click and go. Although they are called interactive, these systems are relatively passive and are a no-brainer to implement; one just buys it.

On the other side is the creation process, a far more difficult endeavor that is over most people's heads. A big creation opportunity concerns presentations. Who wouldn't like to command an array of video, sound, and animation and boom them all at rapt audiences? What IS executive wouldn't want to give the firm's chief executive officer that capability?

Then there is ad hoc multimedia, in which the user can, on the spur of the moment, pull elements of multimedia into his computer to demonstrate a point or simply for fun. We are a long way from the point at which this will be easy.

The latter two forms of multimedia can require great expertise. For example, the act of bringing video into a computer system involves immense complications. Manipulating it and making it part of a larger presentation is even more difficult. That's why people go to school to learn video production.

So far, no one is asking the tough questions. Who is going to manage multimedia? Will it be IS, PC managers, end users or people outside of the corporations such as service bureaus and graphics/video firms? If it is people within the corporation, how will they come to grips with this new technology?

Also, who plans to use multimedia? Do they have the required computer knowledge, access to artistic talent and understanding of specific multimedia hardware and software products? What exactly are their expectations, and why exactly do they want to do it?

I expect these will be the organizational questions IS will grapple with in the coming years.

There are also specific questions one should ask of overexcited multimedia vendors — things such as: how many peripherals are available and how much do they cost? What about file standards for graphics, animation and sound? What about support software such as titling, graphics, animation, image processing, sound and, most importantly, multimedia authoring?

Can the software intercommunicate to trigger synchronization actions? Are the hardware and operating system up to the task of multiple computing- and memory-intensive applications? And who is going to support what?

Oh, by the way: A gen lock syncs a video signal to that of a computer. An SMPTE time code helps sync video to audio, and a single-frame recorder does just that, record single frames to video. Now that we've got that straight . . .

Barney is editor in chief of Amiga World.

MICRO BITS

Dbase IV server under testing

Ashton-Tate Corp. began beta-testing the long-awaited server edition of its Dbase IV front-end database recently but still hedged on a final release date. The Torrance, Calif.-based firm said it will implement a "phased strategy" of incremental releases and asked impatient users to sit tight. "We waited for too long to bring our Dbase IV Version 1.1 and don't want that to happen again," Vice-President Dave Proctor said. The company also announced Framework XE, an integrated package of seven commonly used business applications that will retail for $149.

The **U.S. Customs Department** recently seized some Intel Corp. 80386SX- and 1486-based computers made by **Dolch Computer Systems** that were to be exported to New Zealand-based wholesaler **Dove Electronics.** The shipment was halted on the grounds that it held strategic equipment not cleared for export to New Zealand. "We were told we weren't on the list of [Coordinating Committee for Multilateral Export Controls] countries, whatever that is. Subsequently, we've had to fill in a five-page form and confess we aren't going to give the computers to the 'commies,' " Dove marketing manager Carlton Duston said.

Sales pitch has punch with PC proof

ON SITE

BY RICHARD PASTORE
CW STAFF

CINCINNATI — Retailers are not likely to change their store layout or product mix based on some salesman's hunch. They want proof that changes will pay off in higher sales volumes. Gibson Greetings, Inc., one of the nation's largest greeting card and party goods suppliers, will use a personal computer network to arm its account reps with the proof the retailers need.

The goal of the system is to compile a database of meticulous notes on every location that sells Gibson products — what the sales numbers and turnover rates are, what the particular product mix is, where the items are located in the store, what products are adjacent and what the typical customer profile is. With this information in customized reports, account reps can fine-tune their accounts to maximize sales.

"It's one more tool for our salespeople to go in there with and sell against the competition," said Scott Morgan, head of stock control planning. One example of bringing the data to bear: An account rep walks into one of his stores and shows the proprietor sales figures for a similar store. That second store is selling 31% more party favors than this one because, as the diagram shows, the items are located next to the gift wrap instead of the pet food, as is the case in the first store.

Rick Dennger

Gibson's Morgan *(left) and Martin see more sales in the cards*

"That's a very powerful selling feature to a retail chain; they become very interested in talking with you," said Robert Martin, manager of business systems.

The application rests on two components: Microrim, Inc.'s R:Base database software and Autodesk, Inc.'s Autocad. The account data resides in an R:Base database with capacity for 20,000 accounts running on a Compaq Computer Corp. Deskpro 386E server. Account data is ported to a second Deskpro, where Autocad automatically renders drawings of that specific store's layout.

Two other end-user nodes will be added to the system in the next two months on a Novell, Inc. Netware 286 token-ring network. By year's end, this small network will be linked to a separate corporatewide network served by a Compaq Systempro. At that point, field reps will be able to dial into the system to access account records and drawings and manipulate data for "what-if" analyses.

The payoff for the system, six months in the planning and execution, will come in increased sales and product turnover. Once up and running, it will be a matter of weeks before the $75,000 application payout is recouped, Morgan estimated. "If we can match consumer needs to product mix, we'll maximize satisfaction for the customer, revenues for the retailers and sales for Gibson," Morgan said.

Gibson also needs the system to keep pace with its larger rivals — Hallmark Cards, Inc. and American Greetings Corp. — which have already automated stock control planning, according to Morgan.

Previously, Gibson did its analyses manually. "Sales management had to pull the numbers to analyze them," Morgan said. "They'd come up with pretty much the same analysis, but this allows us to do it at a much greater speed."

The database will also be used by other departments hooked to the corporate network at headquarters here. Marketing can use the demographic data to hone its promotional efforts. Product management will have a better grasp on what sells best in what locations. Even the department that assembles and ships store display shelves can use the data to forecast supply needs, Morgan said.

Though the hardware and programming were relatively cheap to implement, assembling the reams of account data was a major undertaking and is still only 75% to 80% complete. Previously, account-specific information was outdated or simply unavailable, Morgan said.

"The entire sales force had to take time away from selling to document exactly what was in every account," Morgan noted. Because of the time spent on the project and its high profile, "the database had better work — there's a lot of high expectations for it."

Dbase

CONTINUED FROM PAGE 43

future releases. Bradford is also anxious to see the release of Version 1.1's long-awaited Professional Compiler, which recently went into beta testing but is not expected to be available until next year.

Some users said Ashton-Tate tried to add too much too fast with Version 1.0. "They threw in everything but the kitchen sink, so we expected some problems," said Paul Von Fange, a senior analyst at 3M Co. "What I didn't like was the way they handled the fixes — it took far too long." Others understood the painfully slow development process. "I work with government, and I understand bureaucracy," said Bill Campbell, systems manager at South Carolina Water Resources in Columbia, S.C.

Ashton-Tate officials said it took longer than expected to ship Version 1.1 because of an extensive beta-test period that was designed to clear up possible early problems.

By the end of the testing program, Ashton-Tate had enlisted the support of more than 2,700 beta-test sites around the world and tested the program more than 5 million times prior to its release, said Joe Budge, Dbase product development manager.

Caching controller can speed disk-intensive applications

BY RICHARD PASTORE
CW STAFF

As more vendors realize that personal computer performance hinges on disk access as well as CPU speeds, users are seeing an increasing number of disk-optimizing rollouts — from small computer systems interface (SCSI) controllers to disk arrays. Last week, Perceptive Solutions, Inc. expanded the list with enhancements to its disk caching controller.

The Hyperstore 1600, unveiled in February, is a disk controller card with its own 16-bit microprocessor, resident cache and optional daughterboards. The controller can reportedly transfer data at up to 4M byte/sec. vs. less than 1M byte/sec. for standard disk controllers.

The speed comes from the cache, which can be as large as 20M bytes. Data in the cache is retrieved with an access time of .8 msec. The card predicts and controls what data goes into the cache by continually analyzing data use based on 14 sets of criteria.

In one usage example, the controller helped compress a 14-hour stretch of processing into two hours at H&H Production Management Corp., an oil and gas operating and consulting firm in Pittsburgh.

Before generating distribution checks for its oil well investors, H&H used to spend a week processing well invoices and production data in 14-hour overnight runs. With the controller card installed in its Intel Corp. 80386-based 20-MHz clone, the company has reduced the 14-hour runs to a couple of hours and achieved a more timely check distribution schedule, according to H&H President Terry Holt.

Among last week's enhancements to the product is an operating system upgrade that enables concurrent writes to the disk while the controller receives data and manages cache memory.

The vendor also announced a new daughterboard specifically designed to support IDE hard drives. As many as four daughterboards can be stacked on the Hyperstore standard IBM AT-style card, providing simultaneous support for enhanced small device interface, SCSI, IDE and other drive types. With the card's support, users can mix most drive types within a single PC, the firm said.

The controller is intended primarily for multiuser or server machines engaged in disk-intensive applications such as network file serving, image and voice processing, accounting, desktop publishing and engineering.

The $900 card and $275 to $400 daughterboards are available to corporations direct from Dallas-based Perceptive Solutions, Inc. A drive-specific controller card intended for stand-alone PCs and costing about half the price of the 1600 will be unveiled at Comdex/Fall '90 next month, according to the company.

Sun announces 'dumb' printer

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc.'s new laser printer uses the power of the workstation instead of putting a processor in the printer itself.

The Sparcprinter, announced recently along with its unbundled software, Newsprint, will work coupled with a Sun workstation or with another host on a network, according to the company. However, the printer does use an extra 4M bytes of memory.

"We recommend a 12M-byte Sparcstation," said Wayne Rosing, vice-president of desktop systems and graphics at Sun.

The printer is slated to be available next month for $2,695. The printer operates at 12 distinct pages per minute. Newsprint software alone will cost $495.

The software package will alsowork with other types of printers, including nonlaser types such as those made by Hewlett-Packard Co. and Seiko, Inc.

Savage

CONTINUED FROM PAGE 43

that would like to stop the move to customer freedom [in open systems]."

Zander argues that OSF will do whatever it can to thwart Sun. "If we did black, OSF would do red."

In the last year, OSF rejected not only Open Look as a standard but also Sun's basis for Network File System, according to Zander. Unlike Open Look, Sun's NFS is used in many vendors' products. NFS, a means to move data among different platforms over a network, may be less contentious than a graphical user interface and thus has been easier for other vendors to adopt.

While Zander says that Sun pays attention to product volume in the marketplace as creating de facto standards, not standards blessed by OSF, it looks like the company has drawn a line in its sandbox at Motif. Zander refuses to say whether Sun will adopt Motif if there are enough users out there to make it not only the OSF-blessed standard but also the de facto standard. He acknowledges, however that Sun's independent software vendors are "bitching" at Sun because they'd like to write to only one standard.

Robert Duncan, chief executive officer at Sparc International, an independent organization that includes Sun, other Scalable Processor Architecture hardware vendors and independent software vendors, says that his members do not want to make the effort for a separate Open Look port, either. Even worse, that group, dedicated to spreading Sun's Sparc architecture in any way possible, refuses to endorse Open Look. For the record, neither does it endorse Motif.

Zander has nothing to say about HP, the OSF member that submitted the underpinnings for the Motif standard, but blasts IBM and DEC because they don't have their hearts in the open standards issue, preferring to lock people into proprietary systems. "Do those companies have their best interests in open systems?" Zander asks, swearing that "Sun will live and die by open standards."

Living and dying is one thing firms do, sometimes on very short notice when the market passes them by. Not that any demise of Open Look will kill Sun, but if management is pinning that much on its success, it does make Sun look inflexible in a market that requires flexibility.

Anecdotal information passed on from analysts says that Sun has been losing accounts because of its insistence on Open Look, because major users want the same graphical user interface on all their heterogeneous equipment.

I can't say which is actually the better interface. Each has its adherents, and standards are not always based on the best technology. But if Motif is as prevalent as it seems, then Sun just might want to back off on its stubborn resistance in trade for more sales. This isn't ideology; this is simple capitalism.

Savage is a Computerworld West Coast senior correspondent.


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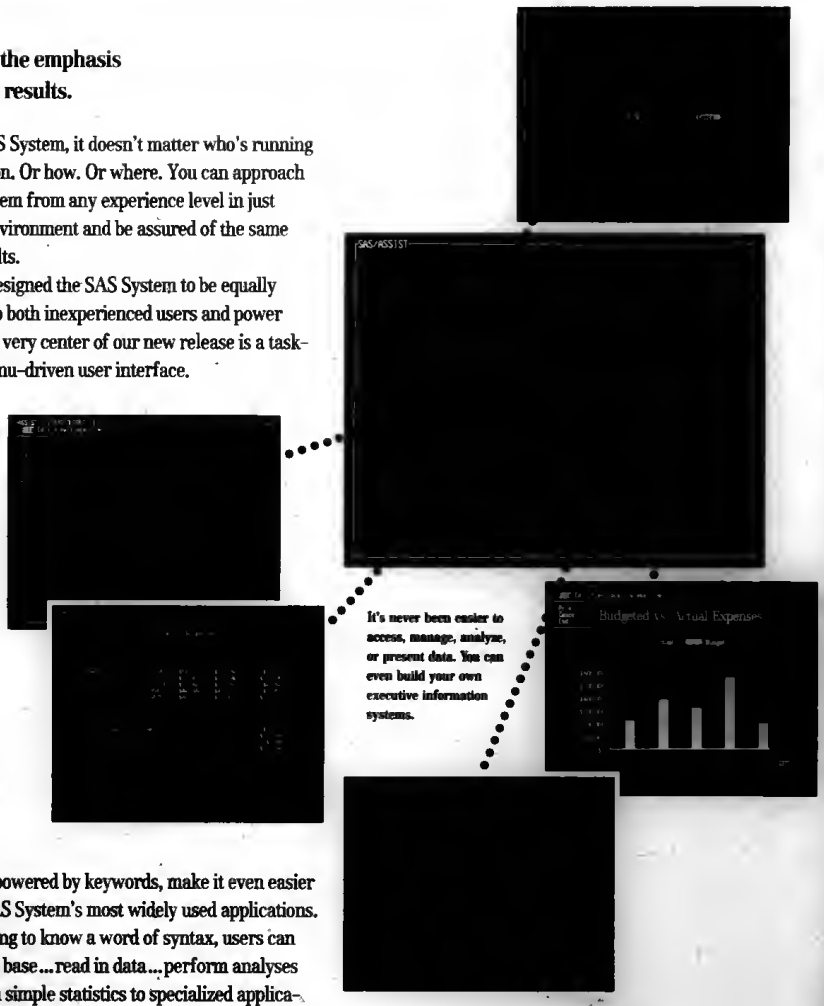

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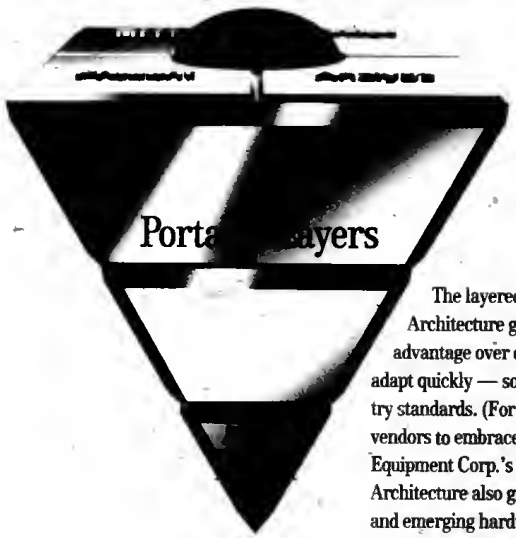

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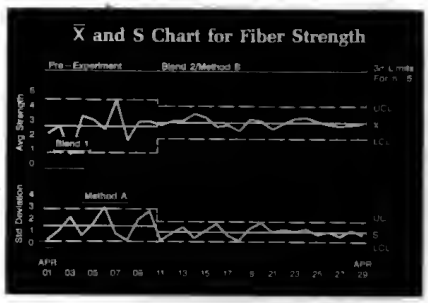
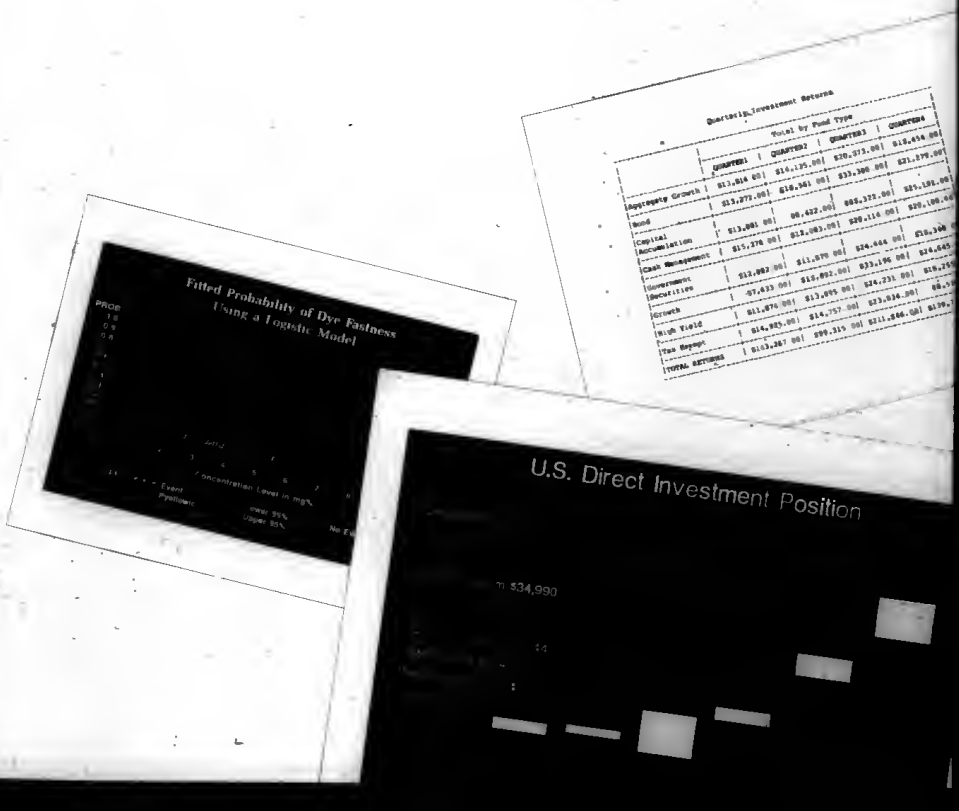
And once you have analyzed your data, the SAS System makes it easy to get the attention you, and your data, deserve. Our data *presentation* capabilities are unsurpassed — from simple printed lists to spectacular full-color graphics. Here's just a sample:



You can rely on one software to handle all your analytical needs.



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Buying power

CONTINUED FROM PAGE 43

tory," Rankin says. "Instead of having 50 different types of PCs and clones to maintain, we have perhaps three or four."

Without standards and tight purchasing controls, IS would indeed be overwhelmed by the mix of machinery that would otherwise wind up in user departments, analysts say. "In all the muddle, it's a wonder that anybody keeps stuff running, let alone successfully analyzes and upgrades," says Paul Zagaeski, an analyst at The Yankee Group in Boston.

One would expect many end users to begrudge IS' control. "The ones that use [the PCs] should be the ones that decide what people get," says Betty McDonnell, manager of word processing at Houston-based insurance firm Burke-Daniels Co.

McDonnell says she would like more control over purchasing decisions. For example, she would have preferred dedicated word processors over the PCs chosen for her department's network.

Despite user complaints, Deloitte Touche's accounting competitor Coopers & Lybrand also tightened the reigns on PC procurement. "When I came aboard here, we had a hodgepodge of equipment," says Stephen Rood, manager of microcomputer technology. "It's hard to administer a very broad, sweeping base."

Today, a technology committee at the New York accounting firm reviews user upgrade requests. IS staffers sit down with users and evaluate such things as graphics and storage requirements for applications, users' communications needs and even weight considerations for laptop PC requests. "We then put together a package of what the hardware and software will be from a two-page list of approved products," Rood says.

Given the local nature of the user base, the evaluation usually takes only a day or two, Rood says. The net benefits are cheaper maintenance and significantly fewer hardware and software compatibility snafus.

The New York City Transit Authority recently established a PC Technical Advisory Committee to oversee and bring some measure of control to its PC proliferation. Made up of representatives from the user departments and central IS, the group is charged with setting hardware standards. For example, the committee recently determined that only desktop machines based on the Intel Corp. 80386SX processor or higher would be acceptable for purchase. It also came up with a list of approved vendors.

By limiting vendors, the authority is hoping to arrange volume purchase discounts with the vendors, says Robert Cucinotta, the committee's chairman.

IS managers say that setting PC purchase standards undermines, in a way, the mandate to serve the user. "You take away their freedom," Rood says. "If someone is hung up about using AST computers and you tell them no, that's not providing the kind of friendly end-user environment that you should be providing."

Even so, IS has dug in its heels at many firms. Aerospace contractor Martin Marietta Corp. runs a tight ship. Users "can't come in and say, 'We want product XYZ,' " says Steven Birgfeld, manager of the IS department's product evaluation center for microcomputers and local-area networks.

Instead, users must file a formal request for evaluation with the IS product evaluation center at each division location. IS staff members prioritize the requests and conduct evaluations, studying users' specific application requirements and coming up with a suggested system configuration. The process is lengthy. A user could wait three to six months from the time of request until the new system arrives, Birgfeld says.

Some users complain about the delay, Birgfeld says, but he contends that 80% comply with the standards process. Perhaps users acquiesce because the alternative is worse than the wait. "If they don't [comply], they must understand that they're going to be somewhat on their own with maintenance," Birgfeld says.

Leave it to the users

Not everyone is taking such an autocratic line. The IS folks at Armco Advanced Materials Corp. set product standards, but they leave the needs evaluations up to the users.

"I'm not going to argue with somebody's vice-president about what they ought or ought not to have," says Tom Lutz, chief information officer at the Butler, Pa.-based steel maker. The justification for a new PC takes place within the user department, and Lutz is content to leave it there.

"We're here to facilitate, not to be a barrier," he says. The lag time between a PC purchase request and its installation on the user's desk is about two weeks.

Helping the user decide for himself and facilitating purchases is also the guiding philosophy at Florida Power & Light Co., an investor-owned utility based in Miami. "We've published guidelines but put the responsibility on operating department management," says William Wallace, manager of user access services. Florida Power's central IS group does review the purchase justification, "but we think people are using good business judgment."

PC pointers

William Wallace, manager of user access services at Florida Power & Light Co., may not control end-user procurement practices with a heavy hand, but he does have the following PC evaluation tips for end-user managers:

- **Make sure you know the old PC's repair history.**
- **Be aware of the old PC's functionality compared with user needs.**
- **Have a clear understanding of the potential productivity gains to be had from a faster processor.**
- **Take into account new applications demands.**

RICHARD PASTORE

Apollo blasted by users over system security glitches

BY J. A. SAVAGE
CW STAFF

Hewlett-Packard Co.'s Apollo Division recently got a dressing-down from more than 70 users over the way it has and has not handled complaints on its operating system security and over support in general.

An open letter to the company complained that "Apollo users have formed the impression that Apollo support has become the poor relation within HP." More specifically, they complained that users have "difficulties in finding out what bugs are known and what patches are available" and that there are "long delays in delivery of software and hardware."

In a response from HP, the company acknowledged knowing of the "need to dramatically improve the flow of information regarding known software problems and relevant patches."

HP made a pledge that beginning in February 1991, it will publish a monthly defect status report.

Another facet of the letter to HP was a discussion of the security of Apollo's Domain operating system. Details of the problems were deliberately omitted from the open letter to keep hackers from discovering them. HP responded that users have found those security glitches to be helpful and problematic and that it will develop a technique to make them optional.

Users contacted by *Computerworld* who had not signed the open letter knew the security issues well, but they have found them to be to their advantage.

"There are a number of loopholes where users can get root privileges," said David Krowitz, systems manager of the Earth Atmosphere and Planetary Science department at MIT. "I use them."

Krowitz and others said they would like to be able to discuss security problems among users but pointed to an inherent paradox in the idea — there is no secure way of doing so and leaving the discussion open.

Lotus trumpets marketing tool for Macintosh

BY PATRICIA KEEFE
CW STAFF

CAMBRIDGE, Mass. — Lotus Development Corp. last week began shipping Lotus Marketplace, a compact disc/read-only memory (CD-ROM) marketing tool for Apple Computer, Inc. Macintosh users, which is also the only Lotus offering for the Macintosh today.

Lotus is on the verge of moving 1-2-3 for the Macintosh into beta testing; the product will not ship in 1990, a spokeswoman said.

Meanwhile, Lotus has two goals for Marketplace, which maintains data on 7 million U.S. businesses.

The spreadsheet maker claimed the application is unusual among desktop software because it provides users with a measurable return on investment.

To back up that claim, Lotus assembled nine users, including one who said he earned $20,000 in new revenue from the first list he created.

Atlanta-based accountants Collins & Collins C.P.A.s said that Marketplace has saved it "hundreds" in advertising dollars by weeding out unlikely candidates.

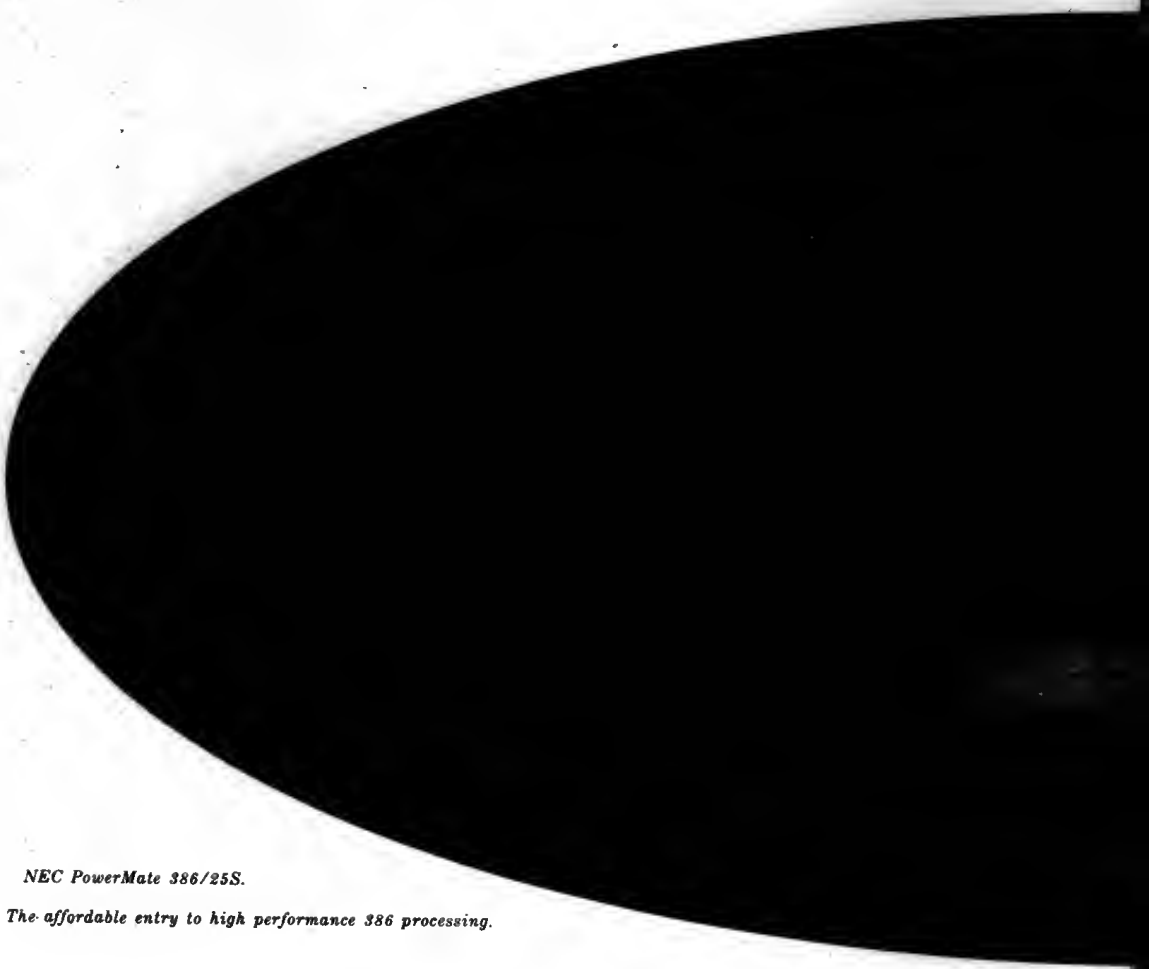
"With Marketplace, I can create a mailing list in minutes, instead of days," said Guy Merenda, president of Wedgemere Associates in Winchester, Mass.

Frank Ingari, vice-president of Lotus' Emerging Markets Business Group, also predicted that Marketplace might be able to help serve as a publicity vehicle for driving sales of CD-ROM drives.

However, the emphasis remains on return on investment and productivity. "When you sell someone a spreadsheet or word processor, it's hard to look them in the eye and say 'If you use this for three hours, you'll either make or save money,' " Ingari conceded.

"With Marketplace, we're finding customers are calling us up and saying that they are making money within an hour," he claimed.

How to make the work go fas



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NEW PRODUCTS

Systems

Sharp Digital Information Products, Inc. has announced an image processor that includes very large-scale integration chips that mimic human vision recognition patterns and support various personal computer-based imaging applications at speeds of 700 million instructions per second.

The product is available as a board-level subsystem or an application development system. The Core Board IV-80-CB is priced at $3,000. An IBM Personal Computer AT-based IV-80-IP development system costs $28,500.

Sharp
16841 Armstrong Ave.
Irvine, Calif. 92714
(714) 261-6224

Cumulus Corp. has announced a small-footprint personal computer that can be configured with a monochrome or color monitor, a floppy or hard disk drive and a 16- or 20-MHz Intel Corp. 80386SX processor.

The GLC/CO includes Microsoft Corp.'s DOS Version 4.01, Windows 3.0 and Works software packages; 1M byte of random-access memory; and a 16-bit Industry Standard Architecture bus with four expansion slots.

Pricing ranges from $1,195 to $1,895, depending on configuration.

Cumulus
23500 Mercantile Road
Cleveland, Ohio 44122
(216) 464-2211

Advanced Logic Research, Inc. has announced the SX Powerflex Model 40, a 16-MHz Intel Corp. 80386SX-based personal computer.

The system includes 1M byte of random-access memory, a 1.44M-byte 3½-in. floppy disk drive, one serial port, one parallel port and a 101-key keyboard. The product is priced at $1,495.

The company also announced that its Powerflex Model 1 and Model 40 are now available at reduced prices of $995 and $1,295, respectively.

Advanced Logic Research
9401 Jeronimo
Irvine, Calif. 92718
(714) 581-6770

Earth Computer Technologies, a division of Alloy Computer Products, Inc., has added an Intel Corp. 80386SX-based diskless personal computer to its Earthstation line of diskless PCs.

Earthstation III consists of an IBM Personal Computer AT-style 101-key keyboard, a network interface and multimode IBM Video Graphics Array-compatible video adapter.

The product is available in 16- or 20-MHz models, which are priced at $1,695 and $2,195, respectively.

Alloy Computer Products
165 Forest St.
Marlboro, Mass. 01752
(508) 481-8500

American Mitac Corp. has introduced a computer system designed to serve as a atand-alone workstation or as a local-area network file server.

The Mitac 3070G is a 33-MHz Intel Corp. 80386-based small-footprint desktop computer that features 128K bytes of cache memory. The system uses a proprietary 32-bit slot for 4M bytes of random-access memory but can be configured to accommodate a maximum of 16M bytes of RAM.

A basic configuration is priced at $4,995.

American Mitac
410 E. Plumeria Drive
San Jose, Calif. 95134
(408) 432-1160

Software applications packages

Applied Information Systems, Inc. has announced a spreadsheet software package designed for engineers and scientists who require computation levels greater than those of standard financial spreadsheets.

Xess runs under the Open Software Foundation'a Motif on Unix and Digital Equipment Corp. VAX/VMS workstations. It features built-in scientific and engineering functions and all standard spreadsheet financial functions.

The program is available at an introductory price of $495 per workstation until its mid-October scheduled shipping date.

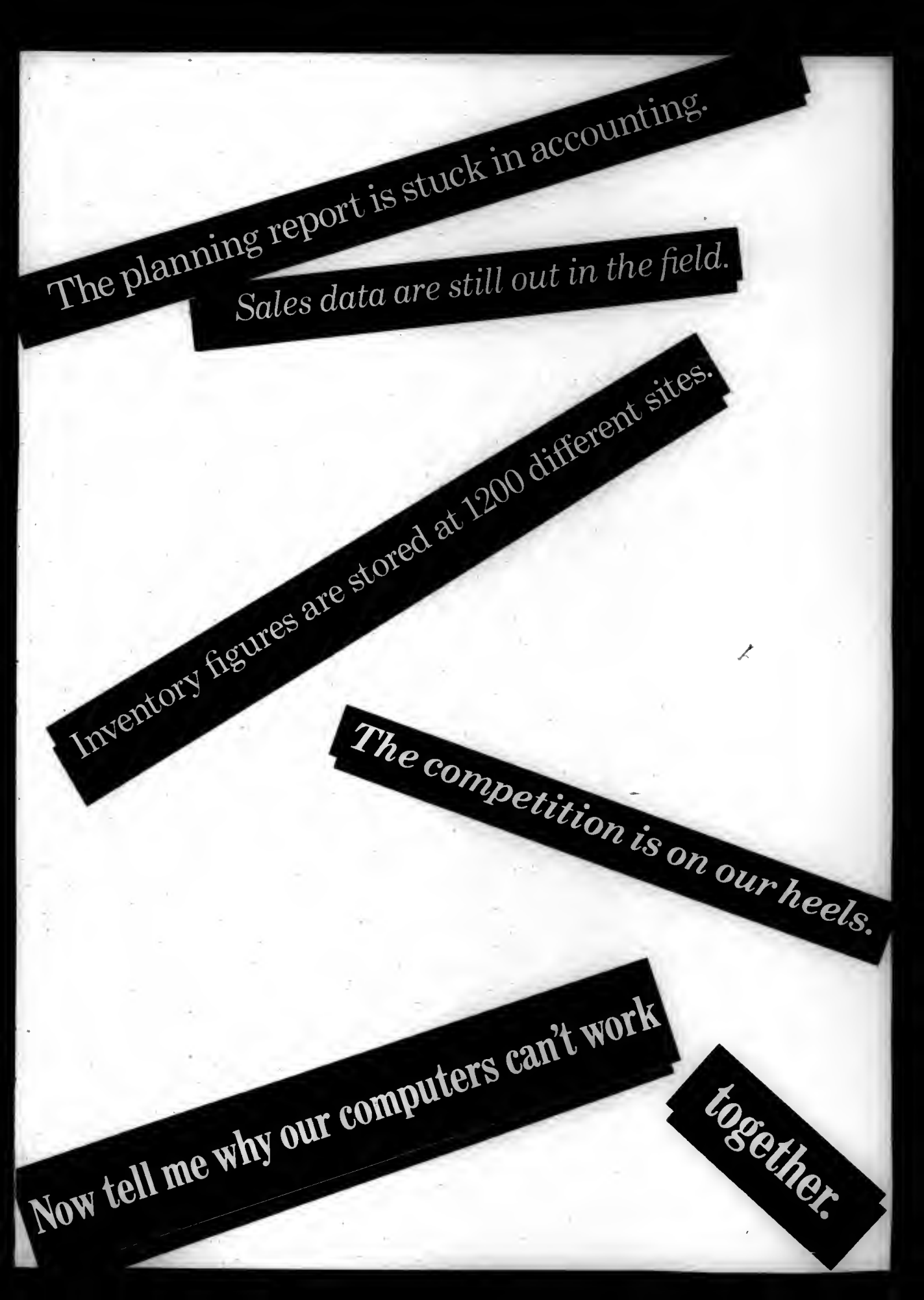
Applied Information Systems
500 Eastowne Drive
Chapel Hill, N.C. 27514
(800) 654-2596

HNC has announced a software package designed for IBM Personal Computer ATa or compatibles running Microsoft Corp.'a Windows Version 3.0. Explorenet 3000 acts as neural network software that enables users of Windows 3.0 to use an icon-based environment to develop applications without requiring any programming. The product is priced at $1,495.

HNC
5501 Oberlin Drive
San Diego, Calif. 92121
(619) 546-8877

Strategic Mapping, Inc. has announced Version 4.5 of Atlas Mapmaker, a software package that enables users of Apple

Continued on page 56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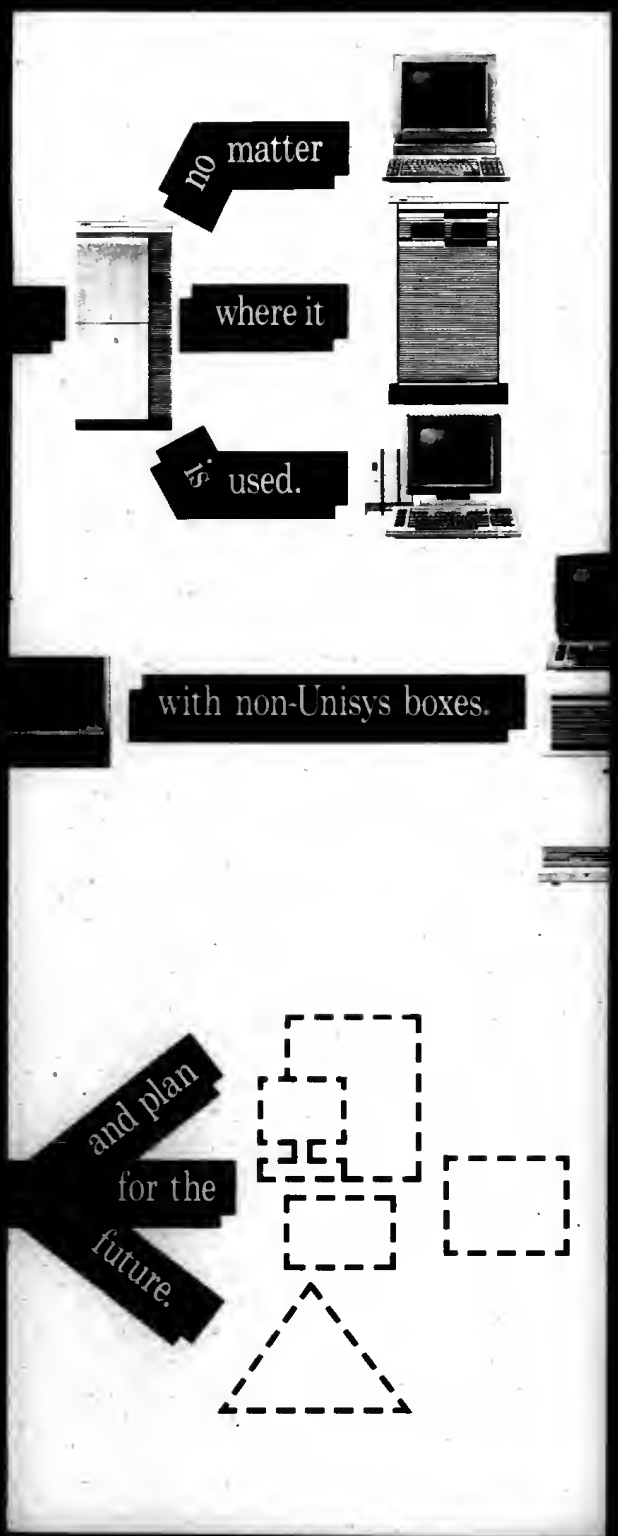

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Continued from page 52

Computer, Inc. Macintosh systems to link maps to databases or spreadsheet files and publish maps that indicate geographic relationships between data.

The product runs on Macintosh 512K, Plus, SE and II series machines and is priced at $495. Registered users of Version 4.0 can upgrade their systems for $95.

Strategic Mapping
4030 Moorpark Ave.
San Jose, Calif. 95117
(408) 985-7400

Time/Design, Inc. has announced Timebase, a personal information manager software package designed for users of personal computers.

The product allows users to schedule, prioritize and delegate multiple activities and includes a DOS gate that enables users to move directly to other programs.

Timebase is priced at $195.

Time/Design
11835 W. Olympic Blvd.
Los Angeles, Calif. 90064
(213) 312-0288

Cadworks, Inc. has begun shipping Release 107 of Drawbase, a software package designed for computer-aided design database applications.

The product features support for Phar Lap Software, Inc.'s Phar Lap 386/DOS-Extender and includes an application programming interface that allows users to load and execute externally developed application programs.

System requirements include an Intel Corp. 80286-, 80386- or 1486-based computer equipped with a math coprocessor and 3M bytes of extended random-access memory.

Pricing ranges from $1,995 to $5,495, depending on the type of model.

Cadworks
222 Third St.
Cambridge, Mass. 02142
(617) 868-6003

Software utilities

Advanced Software, Inc. has announced a software utility designed to allow users of Apple Computer, Inc. Macintosh systems to store an unlimited amount of names and addresses and up to 14 pages of notes with each address.

Intouch Version 1.0 includes features such as fast searching, extensive telephone dialing options, envelope label printing and previewing and immediate copying of addresses to and from other applications.

The product is priced at $70.

Advanced Software
1095 E. Duane Ave.
Sunnyvale, Calif. 94086
(408) 733-0745

Frame Technology Corp. has announced a software program designed to seamlessly integrate Lotus Development Corp.'s 1-2-3 spreadsheet data with Framemaker Version 2.1, its publishing software package for producing business and technical documents.

The Unifilt for Spreadsheets package is part of the Frame Partners Program, an agreement among Frame, Lotus and Unifilt Co. It runs on Sun Microsystems, Inc.'s Sun-3 and Sparcstation, Digital Equipment Corp.'s VAX 5000 and Ultrix systems and IBM's RISC System/6000 workstations.

A single-node license costs approximately $380.

Frame Technology
1010 Rincon Circle
San Jose, Calif. 95131
(408) 433-3311

Trend Micro Devices has announced the PC-cillin Virus Immune System, an antivirus system that uses hardware and software components to protect systems from all known computer viruses.

The product includes a hardware immuniser that includes nonvolatile enhanced erasable programmable read-only memory that safeguards boot sector data and partition records, the vendor said.

A terminate-and-stay-resident filter program features three levels of virus protection: detection, prevention and quarantine. The product costs $139.

Trend Micro Devices
2421 W. 205th St.
Torrance, Calif. 90501
(800) 228-5651

Macintosh products

Ventura Software, Inc. has announced a version of its desktop publishing software package designed for Apple Computer, Inc. Macintosh environments.

Ventura Publisher Macintosh Edition includes a spell checker, movable dialog boxes, 300 on-line Help menus and file import and export capabilities. System requirements include a Macintosh Plus, SE, SE/30, II series or portable with 2M bytes of random-access memory.

The product is priced at $795.

Ventura Software
15175 Innovation Drive
San Diego, Calif. 92128
(800) 822-8221

Data storage

Micron Technology, Inc. has announced a 2M-byte single-socket memory module designed for Compaq Computer Corp. Deskpro 386/33, 486/25 and Systempro computers.

The Ascend dynamic random-access memory expansion module uses a 32-bit data path and attaches to a system's current memory board to increase memory to 16M bytes or more, depending on the

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type of machine.

The product lists at $374.

Micron Technology
2805 E. Columbia Road
Boise, Idaho 83706
(208) 383-4000

Mass Optical Storage Technologies, Inc. (MOST) has introduced a rewritable optical disc drive that uses removable 3½-in. media.

The RMD-5100-S, part of the MOST RMD series, features entry-level formatted capacities of up to 128M bytes on ANSI-standard 3½-in. rewritable optical disc cartridges. Its average seek time is rated at 35 msec, and a short scan/seek function allows data within a 128-track band to be accessed in less than 9 msec, according to the vendor.

The RMD-5100-S is scheduled to be released next month. It is priced at $2,425 in single OEM quantities.

MOST
11205 Knott Ave.
Cypress, Calif. 90630
(714) 898-9400

Priam Systems Corp. has announced a line of 200M-byte full-height 3½-in. disk drives that are equipped with an adapter card for Intel Corp. 80286-, 80386- and I486-based IBM Personal Computer ATs and compatibles.

The ID200L series includes three models: the ID200L-IC ($1,551), the ID200L-IF ($1,531) and the ID200L-I ($1,500). All the drives were designed to provide access with a 15-msec seek time and to operate with a 50,000-hour mean time-between-failure rate, the vendor said. The drives are IBM BIOS-compatible and support bus speeds of up to 16 MHz.

Priam Systems
1140 Ringwood Court
San Jose, Calif. 95131
(408) 954-8680

Peripherals

Microtouch Systems, Inc. has announced an integrated, flat-panel display module designed for use in industrial or hostile environments.

The EI Touch Monitor features an electroluminescent display that is compatible with IBM's Enhanced Graphics Adapter and a capacitive touch screen that enables users to make contact with the sensor through thin layers of dirt, moisture or other material that builds up on the screen, the vendor said.

A single unit is priced at $1,995.

Microtouch Systems
55 Jonspin Road
Wilmington, Mass. 01887
(508) 694-9900

Curtis Manufacturing Co. has introduced a track ball that features plug-in ADB compatibility and optomechanical engineering.

The Curtis MVP Mouse includes three click command buttons that are wrapped around the top two-thirds of the track ball. A custom control panel enables users to assign dozens of commands to the three command buttons and select preset tracking or double-click speeds.

The product is priced at $150 and includes a one-year warranty.

Curtis Manufacturing
30 Fitzgerald Drive
Jaffrey, N.H. 03452
(603) 532-4123

Radius, Inc. has announced that Version 1.1 of its Radius PC software package is included free with its 19- and 21-in. Two Page Display Systems.

The software package includes drivers for Microsoft Corp.'s Windows Version 3.0, Wordperfect Corp.'s Wordperfect Version 5.1 and Version 10 of Autodesk, Inc.'s Autocad. The Two Page Display Systems (TPD/19 and TPD/21) enable users to view an entire document without reducing or scrolling, the vendor said.

Model TPD/19 has a list price of $1,395, and Model TPD/21 costs $1,795.

Radius
1710 Fortune Drive
San Jose, Calif. 95131
(408) 434-1010

Alpha Technologies, Inc. has announced a 300-VA standby power supply designed for personal computers.

The Alpha 300 produces a sine wave form that is compatible with computer and peripheral loads and provides electronic overload and short-circuit protection. It includes intelligent local-area network interface options for networked environments.

The product is priced at $419.

Alpha Technologies
3767 Alpha Way
Bellingham, Wash. 98226
(206) 647-2360

Training

Fliptrack Learning Systems, Inc. has released an audio course that highlights the more complex features of Lotus Development Corp.'s 1-2-3 Release 3.0.

Advanced Training for Lotus' 1-2-3 Release 3.0 describes 1-2-3 functions such as linking multiple worksheets, viewing multiple worksheets on-screen and creating macros and other macro uses.

The product includes four audiocassette-based lessons, a data disk and a reference guide. It runs on IBM Personal Computer XTs, ATs and compatibles and is priced at $119.

Fliptrack Learning Systems
999 Main St.
Glen Ellyn, Ill. 60137
(800) 222-3547

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From an interview with Eric Dickstein of Continental Grain

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How big is your network?

"We have over 700 users worldwide on our network, with 24 servers in New York alone. 4 each in Chicago and Geneva. Plus single servers in another 12 offices. Recently we added Zaire, and we've discussed putting them in Hong Kong, Singapore, and South America."

Do you use third-party lines?

"Yes, depending on needs and economics. Mostly, it's GEIS, plus some point-to-point lease lines and dial-up facilities. Even a dedicated 56KB satellite link. And it's all totally transparent."

Why did you select VINES?

"When we started this network 5 or 6 years ago, Banyan was the only company that could satisfy our needs. Today, in my opinion, it still is."

Banyan's VINES is the only network operating system that can effortlessly grow as your company does—even on a global basis. For a further description of Continental Grain's networking challenges and solutions, write or call us at 800-828-2404 (in MA 508-836-2828).

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COMMENTARY

Elisabeth Horwitt

Bottom-line bugaboos

I happen to agree with the financial gurus and political pundits who blame many of our country's current woes on short-term thinking. Politicians' horizons are limited to the next election, so they go for the inexpensive, Band-Aid solution and leave it up to their successors to solve those little leftover problems — such as the federal budget deficit and the disappearing ozone layer.

Similarly, business managers have to please their stockholders with quarterly profits, so they are leery of major investments that do not bring quick returns. As a result, our factories become outmoded and we get skunked by overseas competition.

The above phenomenon has been cropping up more and more in corporate information systems budget planning sessions, with dire results.

I recently asked Jere Thomas, a founder of the Houston 30 — now the User Alliance for Open Systems — why Open Systems Interconnect (OSI) is taking so long to take off. His reply: Users still haven't given vendors a clear signal that they want products based on the networking standard.

"There are no bad guys here," Thomas emphasized. Rather, there are a lot of companies whose investments in technology must answer to bottom-line-oriented investors. Un-

Continued on page 64

OSI management still lacking

Lack of test suite hinders creation of multivendor network management

BY ELISABETH HORWITT
CW STAFF

SAN DIEGO — Open Systems Interconnect Network Management Forum members had little to show in the way of product conformance — let alone multivendor interoperability — at last month's Tele-Communications Association '90 conference.

The second in a series of Network Management Showcases, which the Forum has scheduled for major communications shows during the next year, saw approximately 25 Forum members on the floor but little in the way of network management products that adhere to the Forum's specifications, published last June. This was no surprise, since the Forum's test suite for ensuring such compliance is not due out until December.

"It's too soon. We have a map of our members on the floor but no interoperability," said Keith Willets, chairman of the board of trustees of the Forum.

"The purpose of the early showcases is to steer users to member booths to get a preview of and information about vendors' OSI network management plans," said Jim Warner, the Forum's Communications director.

British Telecom PLC did demonstrate how its Concert network management platform will use OSI to manage various British Telecom global network offerings, as well as an Ungermann-Bass, Inc. local-area network. However, the demonstrated OSI links will not be fully Forum-compliant until they are tested — and the test suite is slated for release by year's end, a Forum spokesman said.

The Forum, which currently has more than 100 vendor members worldwide, is "a good, organized effort, but products are out in the mainstream yet," said Jim Williams, telecommunications manager at the Mervyn's department store chain. Mervyn's, which currently uses IBM's Netview, would like to use OSI rather than IBM's LU6.2 protocol as a way to hook up other vendors' networks to the network management platform, Williams said, because OSI has broader vendor support.

IBM has for some time indicated that it will provide native support of OSI protocols in Netview, "which will mean you can issue a 'get' command from Netview, for example, rather than going through a gateway to translate Netview to OSI commands," IBM spokesman Bob Anderson said. IBM has also implemented OSI network management protocols as a way for its LAN Manager and LAN Station Manager to communicate, according to IBM programmer

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National gigabit net security under fire

ANALYSIS

BY GARY H. ANTHES
CW STAFF

The National Research and Education Network (NREN), also known as the gigabit net and invariably described as a data superhighway, may turn out to be a road with no traffic cops and a highway with no guardrails, critics charge.

A wide range of computer and communications experts in and out of the federal government say that planning for NREN is proceeding with too little thought being given to issues of security and privacy.

However, a number of equally qualified observers scoff at that assertion, saying that security and privacy safeguards belong on the host systems that attach to networks, not on the networks themselves. They point out that in the notorious Internet worm incident of almost two years ago, it was host operating system flaws that admitted the rogue program, while Internet efficiently passed bits precisely as intended.

Both camps seemed to agree on one point: Not enough attention is being paid to security as a whole, with network and computer center managers focusing most of their attention on just making their systems work in an environment of presumed, but not assured, geniality.

At a recent meeting of the Computer Systems Security and Privacy Advisory Board of the National Institute of Standards and Technology (NIST), the board criticized a bill sponsored by U.S. Sen. Albert Gore Jr. (D-Tenn.) that would establish a $1.9 billion program in high-performance computing and communications. The board said that the bill failed to adequately address security and privacy on the NREN, whose development would be partially funded by the bill.

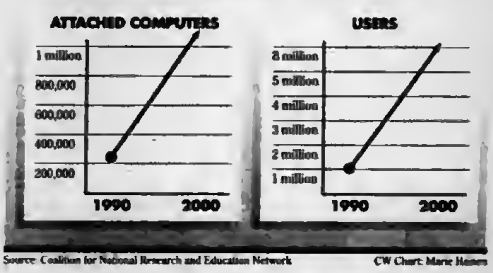
Even defenders of the pending legislation acknowledged that more attention could be paid to these topics, not only for the NREN but for its existing predecessors, the National Science Foundation's network (NSFnet) and other components of the Internet, the global collage of networks used mostly by the research and education communities.

"Security is hard to address because no one knows what to expect," said a Senate staff member who worked on the bill.

Continued on page 63

Sky high

The number of users of NREN and the networks tied to it could total 6 million by the year 2000



Source: Coalition for National Research and Education Network — CW Chart: Marie Hames

Nonprofit firm seeks to create low-cost network

ON SITE

BY J. A. SAVAGE
CW STAFF

BERKELEY, Calif. — Considered by many to be the first electronic bulletin board in the U.S., the Community Memory Project, Inc., a nonprofit communications organization, is implementing a client/server architecture to move into the 1990s.

Community Memory was founded in 1977 by Lee Felsenstein, a free-speech activist and an inventor of the Osborne Computer Corp. personal computer. The organization put four terminals out for public access at retail stores and community centers in 1984. There were forums to speak one's mind, check the city council's agenda, find toxic hot spots in the neighborhood and locate used cars and housing.

In 1988, the Berkeley Co-op food centers went out of business, and with them went two of the most popular terminals. Community Memory then shut down the project while the organization worked on new software. Ten terminals were reinstalled earlier this year in a wider range of public places, including bars and laundromats.

Community Memory had a head start on the new architecture because it has always been on a Unix-based system. However, as an early Unix user, it was saddled with expensive hardware that it could not afford to keep. "We were using a computer from now-defunct Plexus Computers, Inc. that cost $30,000 with dumb terminals," said Terry Beynart, Community Memory's treasurer.

Upgrades were expensive because they had to be bought from the manufacturer instead of on the open market. For example, 1M byte of memory cost about $3,000 when comparable prices on the open market were $700 to $800, according to Carl Farrington, president of the organization. It also carried an expensive maintenance contract, Farmington said.

Cost was a detriment not only to the organization's treasury, but also to its moral foundations. An underlying purpose of the group, which has a staff of five, is to create a low-cost system that other community groups can use to increase communications within their organizations or between the organizations and the public.

The group now has a $10,000 Intel Corp. 80386-based IBM Personal Computer clone running AT&T Unix System V, as well as diskless clones that cost about $300 each, Beynart said.

While Community Memory may have been one step ahead of many corporations by running Unix, it still had to rewrite its software for a client/server model. Despite the fact that it took the tiny organization four years to develop the software, Farrington said, the client/server model is "much more efficient." He said the Unix server functions are suited to the operating system. Functions such as I/O and database management are handled on the server, while the PCs manage screens. On its old host/dumb terminal model, the Unix-based computer had to do everything.

Community Memory wrote its own networking protocol based on the physical configuration of a local-area network. "Instead of terminals scattered around an office, they're scattered around the city," Farrington said. "A wide-area network would have worked but would have been expensive, and part of our design goal was to be low cost."

Speed limits

To cut costs, data transfer speed was limited to 2,400 bit/sec., running over leased lines. The system employs a packet-switched network through limited-distance modems to increase efficiency. According to Farrington, the organization's software could also work on a LAN.

In hopes of licensing its new system to other "struggling nonprofits," Community Memory wrote its system in object-oriented code. It can be licensed on a sliding scale that begins at $200 and is based on the licensee's size, ability to pay and other more esoteric reasons such as how interested the organization is in the new project. "When we aggressively license it, it will be much more systematic," Farrington said. It has one licensee so far — San Francisco State University. Three more organizations are currently negotiating with Community Memory.

Community Memory is still trying to identify and solve problems, not in its system but in the way it can be used. The organization is grappling with a marketing problem: how to encourage people to use this kind of communications as well as what its most valuable use can be — questions not addressed in a traditional networking environment.

The new system was launched with a $94,830 grant from the Telecommunications Education Trust, which is managed by the California Public Utilities Commission. The trust was set up in the wake of the breakup of AT&T to fund groups that would discuss the role of public utilities in society.

Simpler pricing strategy may give LAN Manager edge over Netware

BY JIM NASH
CW STAFF

Now that Microsoft Corp. has both feet in the personal computer-based local-area network market, resellers are re-examining LAN pricing strategies.

They are comparing Microsoft's three-tiered network prices with LAN leader Novell, Inc.'s Byzantine price schedule. Some see a distinct advantage to Microsoft's keep-it-simple premise, especially for information systems managers who are trying to simplify all aspects of buying and operating a LAN.

David Vinzant, president and founder of Vinzant, Inc. in Portage, Ind., said Microsoft could score points with some customers who want a "clearer and easier" price schedule.

Microsoft is suggesting a retail price of $995 for documentation and code for five users and $995 for each additional 10 users. Code for an unlimited number of users is priced at $5,495. Packages at each level contain identical features.

Novell's Netware, on the other hand, is acknowledged even by company Executive Vice-President Darrell Miller to be confusing. In a recent interview, Miller said he regularly reviews prices with an eye toward simplification but has yet to come up with a better solution.

The Provo, Utah-based company has several versions of Netware, each designed and priced for specific network sizes. Beyond that, users can buy applications called network-loadable modules (NLM) that do not operate universally with all Netware packages.

However, Vinzant said, many IS administrators are not looking at price tags or overall price strategies when they buy their networks. "It's an issue of product maturity," he explained. Novell has been in the LAN market longer and has developed distinct products for different needs, Vinzant added. Many of his customers, he said, accept that those products will have differing prices.

Richard Close, president of Soma Training, Inc. in New York, agreed but cited "politics and features" as the deciding factor for most IS departments.

"If a company's got a strong IBM installed base, they are likely to go with LAN Manager," Close said. He said cost would almost always lose to long-range investment protection.

Vinzant said Novell's structure may be a pattern for the future. "I'd be curious to see if in two years LAN Manager is only one product" with the present three-tiered pricing strategy.

Some Netware users and resellers at a recent users conference saw the reverse. They wondered if Netware 386 would follow Microsoft by being molded into a universal core on which all other Netware options could hang.

For example, system fault tolerance, an option currently available only on large-scale Netware packages, could be an option for small offices that require redundant systems. Critics of that idea say it would increase user confusion and make older product versions obsolete.

"That might be a theoretical solution but not a practical one," Vinzant said. "Right now, the user buys one box, and it's got everything you need. You can get NLMs, but that's not the norm." For example, there would be more confusion on users' parts if they needed multiple installation cards to boot up a system, he said.

Non Sequitur

As the originator of one of the earliest, but commercially unsuccessful, database management products, Community Memory rewrote its software so other community groups on a shoestring budget could use the technology.

Community Memory Software is a far cry from Sequitur, the organization's earlier database management system software package. Sequitur was one of the first general database management products available but had little success in garnering market share.

"Community Memory wanted to make a million dollars on [Sequitur] to fund the nonprofit side of the project," said Terry Beynart, the organization's treasurer. However, after premiering at Comdex in 1981, it sold only about 100 copies for Unix and 1,000 copies for IBM Personal Computers, according to Community Memory President Carl Farrington.

For the new community-oriented database, Community Memory scaled down its database management system from the Sequitur product. "Sequitur was designed as a general-purpose database," Farrington said. The new system is geared for ease of use in a text base, where a user can navigate by using key words.

J.A. SAVAGE

BIT BLAST

British Telecom to resell ACC bridge/routers

British Telecom has formed a partnership with **Advanced Computer Communications** to resell and support ACC's bridge/routers. ACC's products will reportedly provide local- to wide-area connectivity to British Telecom's T-Net IN2000 local-area networks across both X.25 packet-switching networks and private circuits.

A networking factory-floor interface between **Digital Equipment Corp.** VAX minicomputers and **Siemens Automation Group** plant-floor devices has been developed to allow DEC VMS applications to communicate with applications running on remote Siemens manufacturing equipment over Ethernet local-area networks. The product, dubbed Decosap/VMS, will reportedly be available this month from DEC.

Nynex Corp. has announced s safeguard to personal privacy issues revolving around caller-identification services, which allow the phone number of an incoming call to be displayed at the receiving site. The regional Bell holding company said that its **New England Telephone Co.** subsidiary will provide callers with a free, per-call blocking feature in areas where the caller ID service is available. The service, slated for initial availability in Vermont this month, will allow a caller to activate a code to prevent the passage of his phone number to the calling destination.

Proteon, Inc. is taking creative measures to fuel the competitive fires in the network adapter card arena by announcing s lifetime warranty for its 4M/16M bit/sec. token-ring boards. The warranty, which applies to all three versions of Proteon's board — Extended Industry Standard Architecture, Micro Channel Architecture and IBM Personal Computer AT — guarantees that adapter failures will be repaired or replaced throughout the life cycle of the adapter. There is s $10 fee to customers who want to sign up for the warranty.

Banyan Systems, Inc. has designed s version of its Virtual Networking Software (Vines) network operating system to support symmetric multiprocessors. Symmetrical multiprocessing allows multiple processors in s server to perform tasks on a first come, first served basis to improve processing time. The new Vines version is compatible with Banyan's Intel Corp.-based 80286, 80386 and I486 single-processor platforms and will support Compaq Computer Corp.'s Systempro server with either two 80386 CPUs, two I486 CPUs or one of each.

OSI

CONTINUED FROM PAGE 59

Jeff Ferla.

IBM and BT are now working on s peer-to-peer link between BT's Concert and IBM's Netview, based on the OSI Common Management Information Services and Common Management Information Protocol, a Forum spokesman said. Products are due out by the end of next year, he added.

IBM is also scheduled to take part in Forum OSI interoperability demonstrations as part of the showcase, but while the demonstrations do point to future products, they give no indication of the time frame for commercial release, said Bob Smith, IBM's director of network management alliances in communications systems.

AT&T plans by the second half of 1991 to provide Forum-compliant interfaces for its Accumaster network management platform and for some of the "elements" that manage its various network offerings, such as Accunet Information Manager, said company spokesman Don Keller. However, AT&T will continue to support its existing Network Management Protocol interface as well as an alarm interface now supported by several third-party vendors, Keller said.

Forum members are likely to initially use the Forum specifications to manage their own as well as business partners' disparate products, Warner said. Interoperability between business rivals may take longer, "which could be s problem if the first three vendors to achieve compliance are all long-distance carriers," he added.

The Forum's OSI network management interoperability showcase series should begin to take off at the Communications Network '91 conference in Washington, D.C., in late January, Forum sources said. "Once large companies begin rolling out products, and there will be s number at each show, the showcase will grow exponentially because vendors that do not take part will become conspicuous by their absence," Warner said.

The Forum protocols released last June allow systems to exchange network management information and perform fault management, Willets said. The next phase will expand the base of managed objects and provide protocols for performance and path management, as well as end-to-end fault isolation, he added.

Security

CONTINUED FROM PAGE 59

"Quite frankly, we haven't put the resources in it yet," he added.

Regardless of one's view on the state of security, neither the issues nor the stakes are trivial. Traffic on NSFnet is growing at 20% per month. Internet connects 250,000 computers on 5,000 interconnected networks supporting more than 1 million users in 35 countries.

Lack of funds is also a problem. Federal agencies are working with the private sector to upgrade NSFnet to 45M bit/sec., and small pilot projects are getting under way to prove the feasibility of a successor intended to work at more than 1G bit/sec., but the project badly needs the funding that passage of the Gore bill would likely bring.

The NIST is required to develop standards for computer security for unclassified systems but has not received the funding it needs. "We need something out of NIST today, or we'll have to retrofit it later," said NIST advisory board member William Colvin.

"Security is not one of the higher priorities [in the NREN pilot projects]," agreed Charles Brownstein, acting head of the NSF's information sciences programs. However, he said, security is not being ignored, and he cautioned against legislative attempts to ensure security: "You don't want [the government] to come in and put a lock on your machine."

A computer security specialist at the U.S. Department of Defense said that security must be addressed at both the network and host levels. The source said that host security does not help if you are using the network for remote log-on.

While some bemoan a perceived lack of attention to network security, much is being done behind the scenes by a low-profile group called the Internet Activities Board (IAB). IAB-sponsored groups are developing standards, policies and technical approaches to improving privacy and security on the Internet. Work is being done in areas from user awareness to improved password selection to more secure routing protocols.

One group is extending the Simple Network Management Protocol so that network commands can be authenticated. Another group is field-testing privacy-enhanced electronic mail so that Internet users will soon be able to send E-mail that is protected by public key cryptography.

According to Steve Crocker, an area security director at the Internet Engineering Task Force, attention to Internet security has increased significantly since the intrusion of the so-called Morris worm. "There's more going on than many people know about, but it's not enough," he said.

Rocky road

Under the rubric of security lie many thorny policies and legal issues, and they are typically overlooked by the technicians whose main goal is to prevent network and host intrusions, said Lance J. Hoffman, a computer security specialist and professor at George Washington University.

Hoffman asked, "Should access to the network be universal? How about foreign access and access from hostile countries? Who should be the gatekeepers? What rules should apply and who should make them? Should users be presumed to be trustworthy until proven otherwise? Is a network manager who erroneously denies service to a suspected wrongdoer liable for damages? Who's liable if transmission errors cause damage?"

Hoffman's list goes on and on, and he said very little attention is being paid to these questions. "Internet management focuses on implementation, not information management policy," he said.

So while the technicians implement elegant solutions to security problems, the results may have to be undone when a consensus emerges on policy matters. "NREN is a lightning rod for policy issues quite beyond its capability to deal with [them]," Hoffman added.

GARY H. ANTHES

Bull package gives PCs more access

BY SALLY CUSACK
CW STAFF

BILLERICA, Mass. — A software package designed to give users of IBM Personal Computer and compatibles access to multivendor, multiarchitecture systems has been announced by Bull HN Information Systems, Inc.

Called VIP-Plus, the package permits PC users to support multiple sessions and transfer files to either a single host computer or a number of hosts via a wide range of terminals and supports multiple host sessions across Ethernet local-area networks. Emulations are provided for Bull, Digital Equipment Corp. and Unix-based host systems, while connections to IBM Systems Network Architecture (SNA) hosts are initiated via 3Com Corp. CS1/SNA gateways.

File transfer capabilities are provided via Kermit and ASCII-text editor methods, and the menu-driven package permits communications via asynchronous and synchronous lines. Multisession LAN communications are possible using XNS protocols, the company said.

The package is produced in Australia as part of a continuing initiative by Bull to manufacture computer products in Australia for export around the world.

According to Joe Keady, Bull's director of export sales, Bull is investing a certain percentage of Bull sales and revenue back into Australian research and development projects in an effort to satisfy the needs of the local market.

"We have a number of products that fit this profile," said Keady, referencing a hardware smart card reader that can be embedded into PCs or LANs and a PC Video Card that allows a television to double as a PC monitor as a result of the Australian/Bull contract agreement. The PC Video Card, which was entirely designed and developed in Australia, will soon be available in the U.S., the company said.

VIP-Plus is available immediately. Prices start at $400 and vary depending on network size.

Horwitt

CONTINUED FROM PAGE 59

fortunately, the benefits of OSI migration are both long-term and hard to quantify, falling into such vague categories as "more effective sharing of information within and between work groups." In contrast, the cost of corporatewide OSI conversion has an immediate negative impact on the IS budget.

Other advanced technologies are losing momentum because corporate managers have a bad case of bottom-line fidgets. At a conference last year, Bill Gaze, who was then a Merrill Lynch telecommunications executive, said that integrated multivendor network management platforms are hard to sell to corporate higher-ups because the benefits of such systems are so very hard to quantify. Ironically, Gaze has since left Merrill Lynch in the wake of a "cost-cutting" outsourcing deal that gutted the firm's telecommunications department.

The idea of moving applications from mainframes down to LANs is another area that both attracts and frightens conservative IS managers. It's pretty easy to pinpoint potential payback areas such as lower-cost CPU power and maintenance, but a lot of companies are holding off on the move because the LAN server and operating system industry is in such flux right now.

An investment company's vice-president of IS recently described to me the contortions he is going through to come up with the most cost-effective platform on which to downsize various workgroup applications. "All I ask is that you don't make it seem like we're overspending," he pleaded at the end of the interview.

With the economy on the slide, IS conservativism is bound to increase before the pendulum starts swinging in the other direction. "The Middle East crisis has created a climate of uncertainty which has put a lot of user projects on hold," says Tom Nolle at CIMI Corp. "People aren't doing strategic telecommunications planning anymore; they are being reactive, not proactive."

This translates into a widespread user reluctance to invest in what will eventually be the next generation of network technology. Users will express interest in the latest buzzwords because "someone told them it's good, and anyone who is anyone in the industry is doing it," Nolle says.

Some 75% of respondents to a recent CIMI survey expressed interest in offerings such as fast-packet and integrated network management. However, few had come up with any concrete plans for implementing these technologies within the next 18 months, Nolle says.

Of course, it's risky now to commit your company's long-term networking strategy to emerging technologies that could fall by the wayside in the next year or two. Making no decision at all, however, puts your firm at the mercy of more technologically aggressive rivals.

"We're creating our own equivalent of the budget deficit," Nolle says, "piling up a burden of shortsighted decisions instead of long-term strategy — borrowing against the capital of successful information integration."

Horwitt is *Computerworld's* senior editor, networking.

NEW PRODUCTS

Gateways, bridges, routers

Synoptics Communications, Inc. has announced that it has incorporated remote bridging features into its Lattisnet intelligent concentrator product line.

The Lattisnet Model 3356 Remote Ethernet Bridge has been integrated as a module into the Lattisnet System 3000 intelligent wiring hub to interconnect geographically dispersed Ethernet local-area networks over wide-area links, including T1.

The product is priced between $11,800 and $14,600, depending on the type of serial lines used.

Synoptics
501 E. Middlefield Road
Mountain View, Calif. 94043
(415) 960-1100

Lantana Technology, Inc. has introduced a line of token-ring bridges, repeaters and multistation access units (MAU) that interconnect microcomputers, minicomputers and mainframes.

The Cypress/B7404 ($4,995) and Cypress/B7412 ($5,995) token-ring bridges are source-routing devices that connect network rings to departmental rings. The Cypress/M8228 ($595) and Cypress/M8228D ($695) MAUs support 4M- and 16M-bit/sec. token-ring LANs.

The Cypress/R8218 ($795) and Cypress/R8218D ($845) repeaters connect two segments of a token-ring network while filtering, boosting and retiming network signals.

Lantana Technology
4393 Viewridge Ave.
San Diego, Calif. 92123
(619) 565-6400

Racal Interlan, Inc. has announced a stand-alone gateway server designed to link Novell, Inc. Netware-based machines with Transmission Control Protocol/Internet Protocol (TCP/IP) hosts.

The TCP Server for Netware allows bidirectional transfers of TCP client and server applications. Client applications can be downloaded to a Netware DOS or OS/2 machine without a need for any additional configurations or installations, the vendor said.

The product is priced at $5,995.

Racal Interlan
155 Swanson Road
Boxboro, Mass. 01719
(508) 263-9929

Network management

International Business Software, Inc. has announced a suite of real-time administration tools designed for Apple Computer, Inc. Macintosh networks.

Netcontrol provides network administrators with data pertaining to the status of each piece of hardware in the network and to all the software in the Macintosh systems.

The product is scheduled to be available next month, the company said. It is priced at $249 per administrator for a single zone and $649 per administrator for multiple zones.

International Business Software
1270 Oakmead Pkwy.
Sunnyvale, Calif. 94086
(408) 522-8000

Synoptics Communications, Inc. has announced a Simple Network Management Protocol-based network management applications package designed for small to midsize networks.

The Lattisnet Basic Ethernet Network Management package is a DOS-based management application that provides physical layer monitoring and control of Lattisnet Ethernet networks.

The product runs on IBM Personal Computer AT and Micro Channel Architecture-based PCs. It is scheduled to be available in early December and is priced at $2,295.

Synoptics Communications
501 E. Middlefield Road
Mountain View, Calif. 94043
(415) 960-1100

Certus International Corp. has announced Version 2.0 of its Certus and Certus LAN systems management software.

The product provides virus protection and detection, disaster recovery, system security and usage monitoring features. A boot lock feature enables PC managers to restrict access to a hard drive after booting from any device other than drive C, the vendor said. A scanning module (Certus VS) checks for more than 100 known viruses in random-access memory and on disk.

The product costs $189, the company said.

Certus International
13110 Shaker Sq.
Cleveland, Ohio 44120
(216) 752-8181

Modems

Microcom, Inc. has announced a CCITT V.32 modem that features support for V.42 and V.42 bis.

The QX/432hs can transfer data at maximum speeds of 38.4K bit/sec. It provides two methods of data compression: Microcom Networking Protocol 5 and V.42 bis.

Automatic logon procedures, password connection security and remote access features are also included.

The product costs $1,099.

Microcom
500 River Ridge Drive
Norwood, Mass. 02062
(617) 551-1000

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MANAGER'S JOURNAL

EXECUTIVE TRACK

Della Kennelly has been appointed director of information systems at **All America Termite and Pest Control, Inc.**, an Orlando, Fla.-based pest-control firm operating in five states with $30 million in sales and 600 employees.

Kennelly has more than 10 years of IS management experience, which includes seven years at the Suntrust Corp. She has also worked as an independent data processing consultant.

Kennelly holds a bachelor's degree in mathematics from Florida Atlantic University and a master's degree in mathematics from Clemson University, as well as an MBA from the University of Central Florida.

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Irene W. Sherk has been named to the position of assistant director of the Tax Systems Division of IS management at the **U.S. Internal Revenue Service** (IRS) in Washington, D.C.

Sherk assists the division's director in planning and developing computer processing for the IRS tax administation system.

Sherk was most recently the project director for two major tax system modernization efforts at the IRS.

She previously served as a senior executive advisor at Ameritech as part of the President's Commission on Executive Exchange program.

She holds a bachelor's degree in mathematics from Pennsylvania State University.

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Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any IS job changes in Executive Track. When you have news about staff changes, be sure to drop a note and photo or have your public relations department write to Clinton Wilder, Senior Editor, Management, *Computerworld*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

'When?' is now at Sears

Retail giant is working to regain its leading-edge competitive advantage

BY MICHAEL FITZGERALD
CW STAFF

"When?" challenges the sign on the door of Robert Ferkenhoff's office on the 42nd floor of the Sears Tower in downtown Chicago. The sign was put on the doors of all the top officers at the Sears Merchandise Group during Sears, Roebuck and Co.'s restructuring in 1989 to push executives to meet the new business plans.

Ferkenhoff, vice-president of information services and quality development for the Merchandise Group, keeps the sign on the door. The question still applies, particularly now that a 6-year-old plan to revamp almost all of Sears' retail systems is taking effect. For the past two years, major systems that handle distribution, billing, product ordering, store layout and other essential business functions have been rolling into place.

"You cannot separate information technology from our business — it touches everybody and it touches every aspect of our business," Ferkenhoff says.

Sears was once considered a leading-edge user of technology in retailing, but the gray-templed retail giant found itself with aging systems that were, Ferkenhoff says, "a competitive disadvantage." Ferkenhoff, who started at Sears in 1964 as a management trainee and worked his way up to national retail manager, joined the systems side in 1982 and was named to his current post in February 1989.

His challenge is formidable; IS must help reverse shrinking profit margins and a bloated corporate structure that analyst Richard Nelson of Duff & Phelps, Inc. says will have to be cut by $1 billion before the company can again become competitive. Sears' retail business, once larger than the next four U.S. retailers combined, is now about the same size as both K Mart Corp. and Wal-Mart Stores, Inc. Profit margins are razor-thin; the Merchandise Group earned just $72 million on $14.72 billion in revenue in the six months ended Sept. 30.

Sears' Ferkenhoff *has led an extensive reorganization of IS*

However, Sears is investing tremendous amounts of money in technology: Ferkenhoff oversees a budget that amounts to 1% of the Merchandise Group's annual revenue of $30 billion, or approximately $300 million. He has also done an extensive reorganization of IS, chopping bureaucracy and dispersing resources to improve responsiveness to business needs.

This particular period is one of the most active in Sears's IS history, as a number of large new systems have been implemented in the past two years. One of the systems, a Merchandise Assortment Planning System (MAPS), this year won the first Retail Innovation Technology Award from *Chain Store Age Executive* magazine and Digital Equipment Corp.

Technology use "is going to differentiate people" in the retail industry, Ferkenhoff says. "We've heard that

Continued on page 71

Inland Steel's Howard tests his mettle

BY CLINTON WILDER
CW STAFF

Bill Howard said he was ready for new challenges. Now he's got them.

Appointed vice-president of information technology at Inland Steel Industries, Inc. five weeks ago [CW, Sept. 3], Howard's charter is to oversee and coordinate all information systems and communications for a $4 billion company in one of the most brutally competitive industries in the world. The 55-year-old Howard cannot wait to get started.

"I see a lot of opportunity to leverage systems, especially on the distribution side," Howard said, referring to Inland's extensive business distributing steel products made by other manufacturers. "Maximizing inventory turns can contribute significantly to Inland's profits and competitiveness. That's the opportunity and the challenge, but it's not easy."

One of the many prominent IS executives to change companies in the last few years, Howard left the Bechtel Group, Inc. in San Francisco after 18 years, departing the Bay Area for Inland Steel's headquarters in the heart of Chicago's Loop.

Inland Steel's Howard

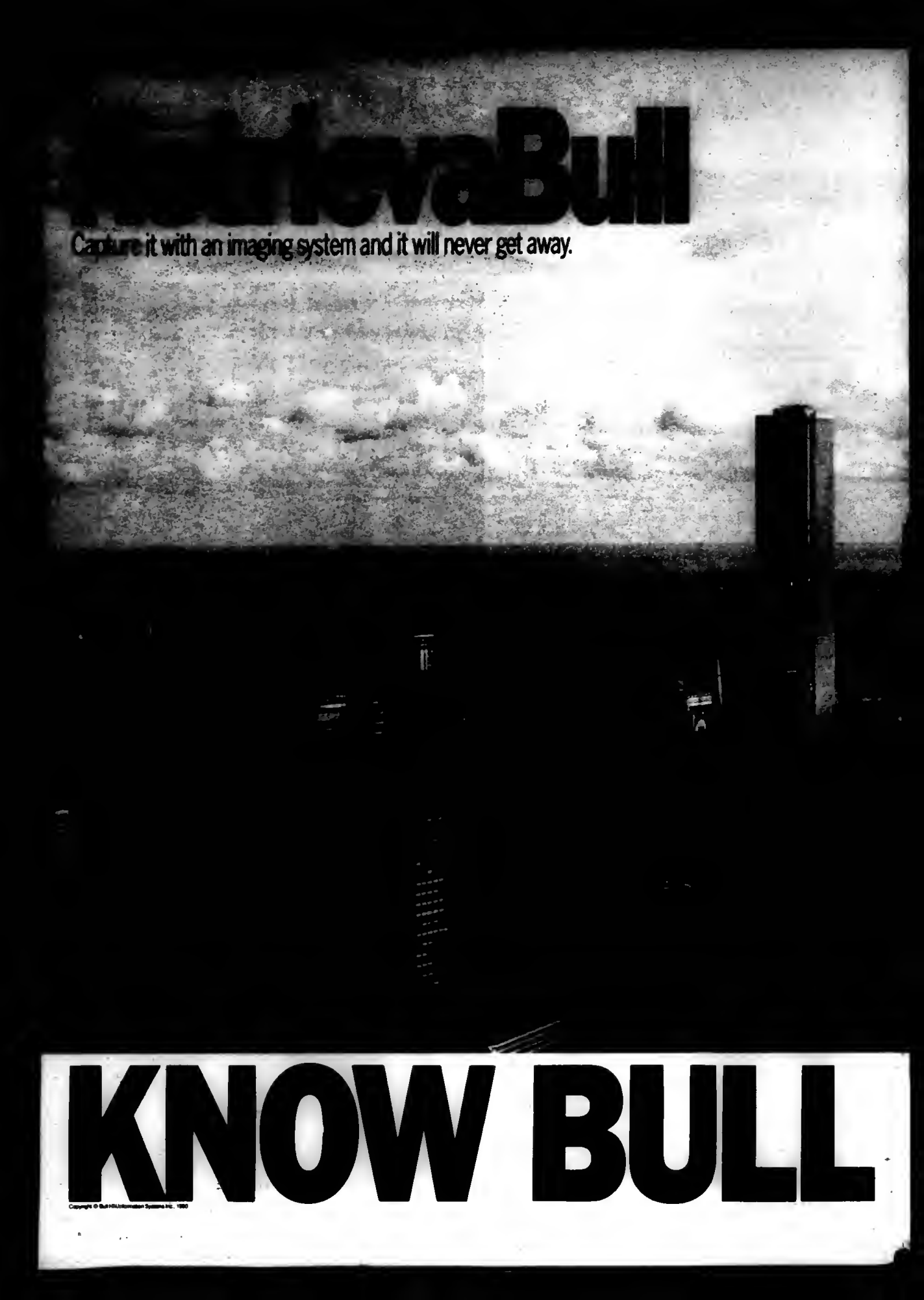
As with many of his industry colleagues who have switched jobs, Howard was offered a newly created chief information officer-level position, reporting directly to Inland Steel Chairman Frank W. Luerssen.

Howard will seek to implement technology links, such as electronic data interchange, between Inland's Ryerson Steel and Toll Metals distribution businesses and the manufacturing sides. "To the greatest extent possible, we should have common systems and one Inland way of doing business," he said.

The IS heads in each business unit, however, will continue to report to the business unit heads. "Recentralization is not the thing to do," he said.

Inland Steel's IS budget for this year was about $70 million, and despite the creation of Howard's job, that will not change very much.

"I'm here to give a corporate view of where money is being spent and how to prioritize it," he said. "I wasn't asked to come in and spend more money."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COMMENTARY

Al Smith

No measure, no change

To hear most IS executives talk about increasing productivity, you would think they were trying to discover perfect love. It is so desirable, emotional (if I don't make my deadline, I can kiss it all goodbye), intangible, indescribable . . . and unattainable.

Like love, many look for productivity in all the wrong places — such as computer-aided software engineering (CASE) technology, re-engineering and outsourcing — without looking in their own backyards. Before any of these solutions can work, you need to have a way to measure your current productivity level. Otherwise, how will you know if your CASE and re-engineering tools are working?

Consider these two friends of mine:

• Bob, a highway contractor, was building a portion of interstate roadway. When I asked him to evaluate the work, he told me that they were laying asphalt at a rate of two miles per day, had 15 miles left to go and would finish the job five days ahead of schedule.

LESS THAN 5% of all IS shops have any type of productivity measurement program at all!

• John, a project manager at a large IS shop, was developing an on-line financial system. His assessment of the project was that it was 80% complete, just starting the systems test and "looked good" to meet their promised delivery date.

Is it any wonder that the users in John's company are dissatisfied with the productivity of the shop? John's staff is working very hard, but he can't say if the job will be done in two weeks because he doesn't know how productive his team is.

John's users do not understand what software production entails, and, based on past projects, they don't feel confident in his ability to deliver on time — and justifiably so. Bob, on the other hand, has metrics to gauge his productivity.

If you decide to try a CASE tool on a project to see if it makes you more productive, start by measuring the productivity you achieved on a similar project in the past that did not use CASE. In other words, if you want to run a four-minute mile, it helps to know how long it takes.

Historically, by creating a productivity metric, we are not breaking new ground in IS. Yet less than 5% of all IS shops have any type of productivity measurement program at all!

Our profession has gone in search of the right metric before. In the 1950s and 1960s, when second- and third-generation languages appeared, we measured the output of programmers in lines of code. In the early 1970s, when life-cycle methodologies appeared and we had consistent project task plans, we used "percent complete" as a measure of productivity. In the mid-1970s, Ken Kolence of Boole & Babbage fame devised a measurement "science" called Software Physics — an idea before its time. None of these programs caught on, however.

Productivity in systems development is measured in terms of what is produced per unit of labor resource expended per day. The more progressive organizations are using function points per day as a productivity measure. When trying to decide whether lines of code per day or function points per day is the right approach for your shop, don't spend too much time on the pros and cons of each approach. The important thing is to pick one approach and implement it consistently.

Remember that your primary objective is to measure your productivity so you can implement change in your organization. Comparing your performance to other organizations or to "industry averages" is of secondary importance.

I have been in many large IS shops and have overheard the arguments on lines of code versus function points and the excuses for why they can't use either — or measure productivity at all, for that matter. These excuses are mostly bureaucratic in nature, contain very little substance and are tolerated because these organizations are so big that they think they don't have to become more productive.

Rubbish! In our contemporary business climate, businesses must be competitive in order to survive. The theme of all the current outsourcing conferences is to do more with less — that sounds like productivity to me!

My friend the contractor needed to be competitive to stay in business, so he determined the correct metric for his purposes and uses it to stay competitive. We in the IS community must do the same.

A metric productivity method won't necessarily bring you perfect love from your users, but it can make your shop sexy in the sense that it will be more productive, competitive and desirable. And the results will be . . . measurable!

Smith is executive vice-president at Bell Atlantic Systems Integration Corp. in Arlington, Va.

Sears

CONTINUED FROM PAGE 67

type of language for a long time, but normally not in terms of the retail industry. It's really becoming a competitive issue in retailing."

By rights, Sears should be easily winning the technology wars. The company claims to be the first retailer to have electronic point-of-sale systems, the first to do electronic data interchange (EDI) transactions and the first with inventory management systems, among other things.

But this has its disadvantages, as Ferkenhoff is quick to point out, particularly with 854 full-line stores, some of which were built more than 50 years ago.

"Systems, just like facilities, grow old," he says. "If you look at the Sears portfolio today, we've got new systems and great systems and old systems. It's a challenge of reinvesting."

The current thrust at Sears Merchandise IS is making systems cross-functional. As part of its effort to make EDI a condition for doing business with Sears [CW, July 16], Sears has developed internal systems that are almost completely seamless across functions, a move Ferkenhoff considers essential to the company's future.

Any Sears executive "can go anywhere [in the company] and access their electronic mail, review past trip reports, bring up performance data — we really have just about any piece of information available to anybody, anywhere," Ferkenhoff says.

Sears' Distribution Operating System (DOS), which Ferkenhoff says is "probably the biggest single systems project the company has ever undertaken," will integrate Sears's approximately 100 distribution sites with all of the in-store point-of-sale systems.

The system will replace all of the functions, automated and otherwise, currently in place to manage the entire movement of goods throughout Sears. DOS will, among other things, allow Sears planners to gauge what is selling and what is not and plan order schedules.

The Sears Apparel Merchandising System (SAMS) has been brought up fully live throughout all of Sears' apparel departments. SAMS allows Sears' apparel buyers and planners to do virtually everything related to their job on-line terminals connected to a mainframe: the fashion plan, buying and replenishment of goods, and performance reports. It also delivers weekend sales reports first thing Monday morning.

Old Fashion-ed system displaced

SAMS replaced Sears' former Fashion system, which Ferkenhoff offered as an example of old technology that had become a liability for the company. Fashion was based on a system more than 20 years old. SAMS was brought in on a division-by-division basis, starting in mid-1989, and was totally live by the beginning of 1990.

At Sears, in accordance with Ferkenhoff's philosophy, the business side owns the systems it uses — no system is put in place without a business rationale, and any system that gets designed is designed by the department in question.

> "SYSTEMS, JUST like facilities, grow old. If you look at the Sears portfolio today, we've got new systems and great systems and old systems."
>
> ROBERT FERKENHOFF
> SEARS MERCHANDISE GROUP

IS also has to come up with new ways to do things. EDI is an application of fundamental technology; Sears Merchandise is also pushing into other realms such as expert systems. Its first expert system was for handling arcane import rules; others since installed include one used by the credit department to automatically determine whether Sears credit card customers should receive credit on a purchase that exceeds their official buying limits.

Sears is also investigating outfitting its field service and repair groups with portable computers that use radio frequency wireless modems. These allow the user to dial into a host machine without being connected to a telephone jack.

Ferkenhoff has radically restructured the 500-strong IS department during his tenure, a move several IS employees said was long overdue. One of his first acts was to break up the large administrative groups that made up Sears Merchandise IS into units aligned one-to-one with their business customers.

Ferkenhoff also made the manager the single point of contact for the end user. Where the IS department heads once were responsible only for in-house development and mainframe work, now they are expected to be a total partner, providing reviews of applications packages, in-house development, end-user computing — whatever the business partner needs to get the job done.

Ferkenhoff backs up his words: At review time, the business side participates, providing Ferkenhoff with feedback on how well IS supports their needs and partners with them.

"My people know that their business is not the systems business, it's the catalog business, or the retail business," Ferkenhoff says. "I tell people in the business these aren't my people; they're your people, your resources."

BOOK REVIEW

Leaving behind the Machiavellian strategy of leadership

WHY LEADERS CAN'T LEAD: THE UNCONSCIOUS CONSPIRACY CONTINUES
By Warren Bennis
Jossey-Bass Publishers

Machiavelli would have had a fit.

As you might recall, the 15th-century strategist articulated a recipe for leadership that called for deceit and manipulation. (Wall Street mavens of the '80s probably slept with copies of Machiavelli's treatises under their pillows.)

Warren Bennis offers us a different formula. In his book, he presents would-be leaders with a humanistic alternative to Machiavelli's approach. For information systems professionals searching for a way to influence the direction of their organizations, Bennis can serve as a guide.

In *Why Leaders Can't Lead*, Bennis expands on a work by the same title he published in 1972. As the University of Southern California professor writes in his preface, the new book is more than a revision. It adds accounts of leadership debacles of the past decade as well as the results of his research.

Bennis sketches a dire picture of the country's "long slide from true leadership." The successive layers of the country's current moral crisis are peeled away like the skin of an onion. "America has never been less interested in achievement and more interested in success," Bennis writes. "At the moment, we not only cannot agree on what the public good is, we show no inclination to pursue it."

The failure of leadership arises from an "unconscious conspiracy" in which we all play unwitting roles. We impede those in charge from carrying out their duties and dissuade those individuals who might otherwise seek positions of power.

In general, Bennis rakes the '80s over the coals of his scathing analysis. He sees Ronald Reagan, Ivan Boesky and Oliver North as the country's gifts to itself in a decade that prized selfishness and despised generosity and ethical conduct.

He turns back to the '60s for a clue to how things went awry. "In America," he writes, "the 1960s were and still are the future, because we never really got there." By the mid-1970s, notions of civic responsibility had yielded to traditional North American demands for individualism and autonomy.

"Never before have individuals wanted and been able to seize so much power unto themselves," Bennis writes, "and never before have they had so many tools to ensure their autonomy."

By the time we get to the book's final section, we hungrily await Bennis' recipe for leadership. How can we foster the qualities necessary to lead us out of the desert?

Shamed by our search for a quick fix, however, we realize that complex problems defy simple solutions. The men and women Bennis is looking for are hard to come by. True leaders, Bennis writes, are people who lead fully integrated lives in which their professional and personal activities "fit seamlessly and harmoniously together." They fulfill their visions of excellence through "the application of passion, energy and focus."

To succeed, Bennis tells us, leaders must communicate a compelling vision of their institution's future.

True tales

Bennis' narrative is at its most powerful when he anchors his reflections in real-life anecdotes, such as the story of Charles Johnson, the overworked university president who died under suspicious circumstances, or Robert McNamara, the Lyndon B. Johnson defense secretary who, sublimating his own moral convictions, oversaw the escalation of the Vietnam War.

Unfortunately, Bennis sometimes trivializes his message by resorting to tried and worn platitudes. For every overused sophism, however, Bennis offers us dozens of profound truths that serve as beacons in an era abandoned to the darkness of an ethical void.

So what is the lesson for the IS professional in all of this? Bennis suggests the answer: "We have more information now than we can use, and less knowledge and understanding than we need. Indeed, we seem to collect information because we have the ability to do so, but we are so busy collecting it that we haven't devised means of using it."

Technology always gallops in advance of society's ability to exploit it most creatively. Since social consensus is slow to forge, IS executives can take the lead in helping their organizations plan for change. IS leaders who want to make a difference in their organizations must make sense out of the information glut they have helped foster. This is where they can bring their visions, integrity and sense of social responsibility to bear.

AMIEL KORNEL

Kornel is a former *Computerworld* features senior editor and is enrolled in MIT's Sloan School of Management.

HOW OTHERS SEE THE MACINTOSH-TO-MAINFRAME CONNECTION.

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"We've got plenty of data... the challenge is to put it in the hands of decision makers in a form they can use. The perfect PC would be an ideal client to all my information systems."

"Every time I turn around, vendors change the operating system or interface. I want to be able to drop the hottest new box on my executives' desks and know their software will run."

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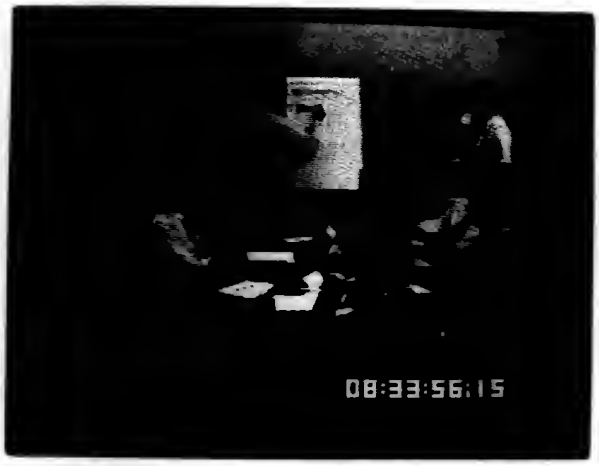
"A graphical interface is clearly important... users love 'em. But the architecture has to be designed to handle it or the performance compromise is unacceptable."

"I'd like to see more discipline from software developers. Commands should be consistent for every application... it would eliminate the cost of constantly retraining."



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CALENDAR

Better management of complex computer systems and consideration of their impact on users and society will be the focus of the Association for Computing Machinery's (ACM) 1990 Conference on Critical Issues. The event is limited to 300 attendees and will be held Nov. 6-7 at the Hyatt Regency Crystal City in Arlington, Va.

The conference will bring together leading information systems thinkers from the areas of business, science, government and academia. Scheduled speakers include Shoshana Zuboff of Harvard University, Robert Benjamin and Jay Forrester of MIT, Rod Leddy of Mobil Oil Corp. and Edward Chevers of the NASA Johnson Space Flight Center.

For more information, contact Jim Adams, ACM, New York, N.Y. (212) 869-7440.

OCT 14-20

IBM Token-Ring & SNA: Gateways, Bridges and Network Management. Washington, D.C., Oct. 17-19 — Contact: Kaptronic, Haworth, N.J. (201) 769-4250.

Mapping to X12 & Edifact EDI Standards. Chicago, Oct. 18-19 — Contact: EDI Group, Oak Park, Ill. (708) 848-0135.

CAD/CAM, CAE Reseller/VAR Strategy Workshops. Bedford, Mass., Oct. 20-21 — Contact: Silvia Bianchi, Darntech, Cambridge, Mass. (617) 354-2339.

OCT 21-27

Association for Computing Machinery's Object-Oriented Programming Systems, Languages and Applications Conference. Ottawa, Oct. 21-25 — Contact: Karen Kourt, OOPSLA, Ottawa, Ont., Canada (613) 723-1495.

RAMIS '90 Roundtable. Nashville, Oct. 21-25 — Contact: RAMIS Registrar, Newark, N.J. (201) 585-6758.

International Congress on Advances in Nonimpact Printing Technologies: Black & White and Color. Orlando, Fla., Oct. 21-26 — Contact: The Society for Imaging Science and Technology, Springfield, Va. (703) 642-9090.

Achieving Lights-Out Data Centers. Boston, Oct. 22-23 — Contact: Richard Gaquinto, Institute for International Research, New York, N.Y. (800) 345-8016.

Datapro Executive Symposium. New York, Oct. 22-23 — Contact: Datapro Symposium Office, Delran, N.J. (800) 328-2776.

International Conference on Desktop Manufacturing: The Rapid Prototyping Revolution. Cambridge, Mass., Oct. 22-23 — Contact: Conference Coordinator, CAD/CIM Management Roundtable, Boston, Mass. (617) 232-8080.

Knowledge-based Systems in Everyday Use: Increasing Productivity and Profits. San Diego, Oct. 22-23 — Contact: Donna Kacin, Decision Support Technology, Cambridge, Mass. (617) 354-6400.

MIS Strategic Planning for Corporate Success Conference. New York, Oct. 22-23 — Contact: Computes Economics, Carlsbad, Calif. (619) 438-7457.

The Western Canada DB2/SQL/DS Users Group Conference. Winnipeg, Man., Canada, Oct. 22-23 — Contact: Peter Barnett, Wescan Users Group Conference, Winnipeg, Man., Canada (204) 946-6600.

Disaster Recovery Conference/Exhibit. Atlantic City, Oct. 22-24 — Contact. DVDR[EG, Cherry Hill, N.J. (609) 778-5702.

Electronic Messaging '90: Beyond Interpersonal Correspondence. San Francisco, Oct. 22-24 — Contact: Electronic Mail Association, Arlington, Va. (703) 522-7111.

LANs: Applications, Design and Systems. Irvine, Calif., Oct. 22-24 — Contact: Program Office at UCI Extension, Irvine, Calif. (714) 856-7774.

North American Information System Security Symposium. Toronto, Oct. 22-24 — Contact. Heidi Spry, Datapro Canada, Scarborough, Ont., Canada (416) 298-1177.

CIPS Edmonton '90, Information Technology Conference. Edmonton, Alta., Canada, Oct. 22-25 — Contact: Canadian Information Processing Society, Edmonton, Alta., Canada (403) 488-1879.

Jerusalem Conference on Information Technology. Jerusalem, Oct. 22-25 — Contact: Tzell, Travel and Tours, New York, N.Y. (800) 288-7908.

NADUG '90: Connecting for the Future. Seattle, Oct. 22-25 — Contact: North American Data General Users Group, Westboro, Mass. (800) 328-2436.

System/Software Assurance Conference. Washington, D.C., Oct. 22-25 — Contact: USPDI, Silver Spring, Md. (301) 445-4400.

Comprehensive MVS/ESA and XA Performance Management Seminar. Marina del Rey, Calif., Oct. 22-26 — Contact: L&S Computer Technology, Austin, Texas (505) 988-3811.

Computernet '90. Boston, Oct 24-26 — Contact: XPOS, Marshfield, Mass. (617) 834-4703.

Electronic Data Interchange. New Orleans, Oct. 24-26 — Contact: Sterling Software, Columbus, Ohio (800) 677-3342.

Information Strategy Planning. New York, Oct. 24-26 — Contact. Performance Development Corp., Princeton, N.J. (609) 921-1866.

OCT. 28 - NOV. 3

Information Strategies for the '90s: Thriving on Change. Palm Springs, Calif., Oct. 28-30 — Contact: CIO Magazine, Framingham, Mass. (508) 872-8200.

Building the Enterprise Internetwork. Phoenix, Oct. 29-30 — Contact: Meta Group, Inc., Conference Dept., Westport, Conn. (203) 226-6382.

Government Communications Conference II. Washington, D.C., Oct. 29-31 — Contact: Corporation for Open Systems, McLean, Va. (703) 883-2700.

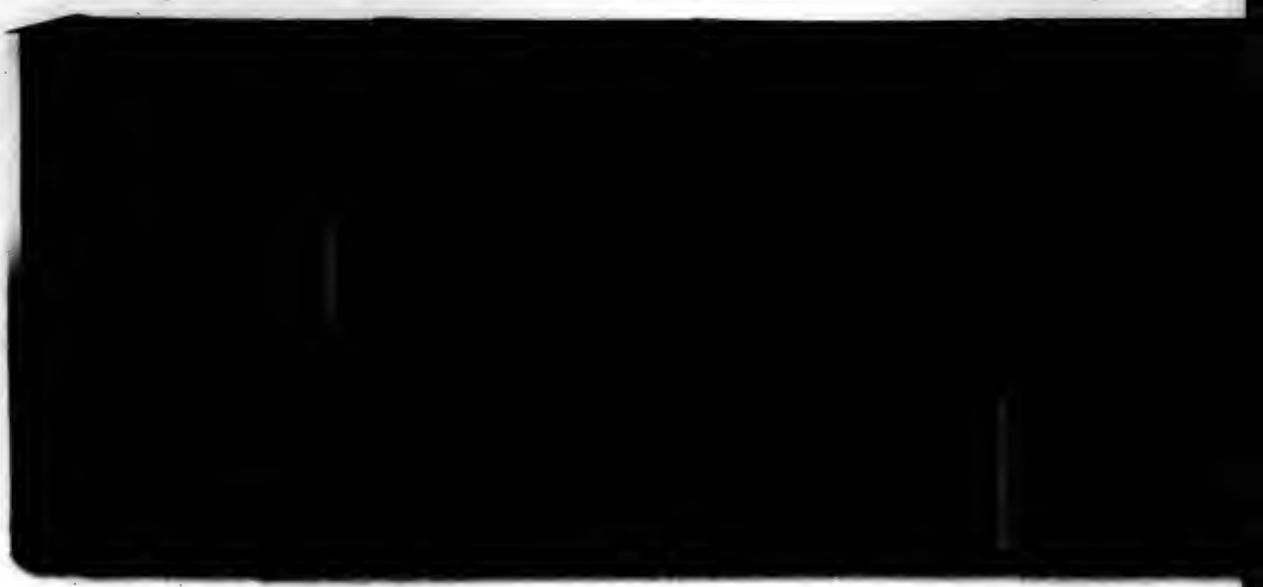
Hammer Forum '90. Cambridge, Mass., Oct. 29-31 — Contact: Hammer and Co., Cambridge, Mass. (617) 354-5555.

The Next Generation Networks Conference. Washington, D.C., Oct. 29-31 — Contact. Tony Shaw, TTI, Santa Monica, Calif. (213) 394-8305.

Pacific Northwest Software Quality Conference. Portland, Ore., Oct. 29-31 — Contact: Tern Moore, Pacific Agenda, Portland, Ore. (503) 223-8633.

IBM Midrange Computer Users Group. Cincinnati, Oct. 29-Nov. 2 — Contact: Common, Chicago, Ill. (313) 644-6610.

The Next Generation Of Mainframe Disk Storage Is Not Bound By Traditional Thinking.



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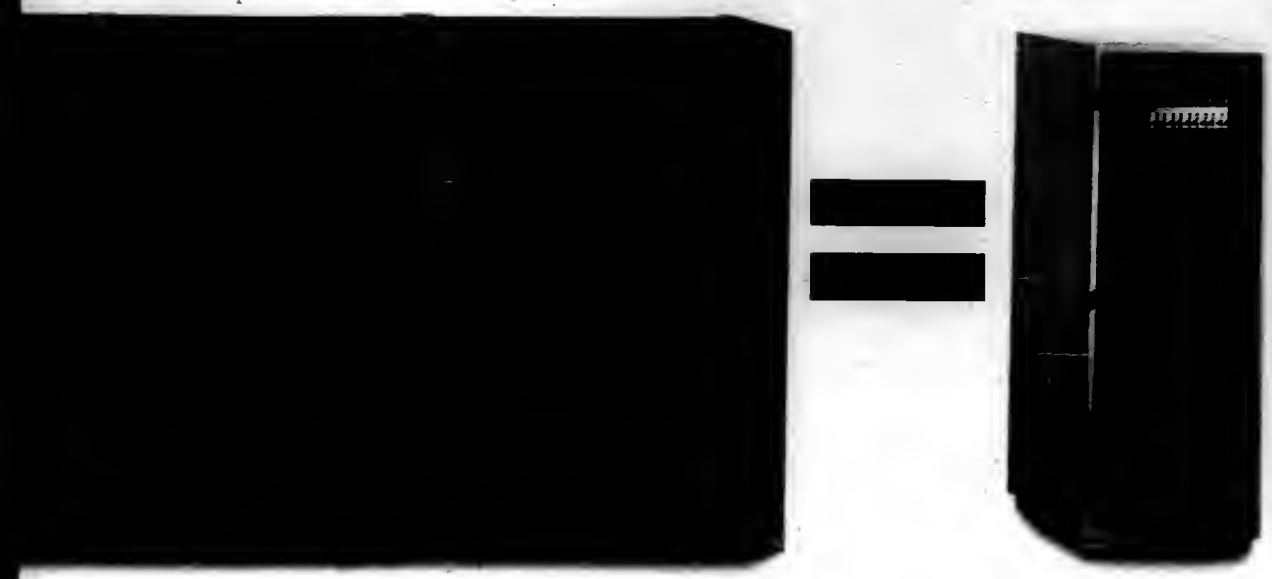
All in one box.



you don't give up CPU cycles for cache management. There's even a feature that allows user-specified files to remain permanently in cache – for absolute maximum performance.

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PERFORMANCE MANAGEMENT AND OPTIMIZATION

Getting the most out of what you've got

BY STAN KOLODZIEJ

Information systems departments are learning a lesson in life: "making do." The days of buying new hardware at the first sign of a system slowdown are over. A declining economy, new system architectures and an effort to "buy strategically" have all played a role in slowing down purchasing plans.

"Controlling IS expenses in a recessionary period is definitely a mandate right now," says Gerard Becker, vice-president of the IBM utility information service at Bankers Trust Co. in New York.

This emphasis on cost containment doesn't mean that IS is off the hook regarding business expectations. Strategic support is still expected but with a smaller price tag. For this reason, "making do" is not such an easy job. It requires IS departments to wring all the power they possibly can out of their current system setup as well as plan their future acquisitions carefully.

To meet corporate demands in tougher economic times and better support changing business strategies, IS departments in larger corporations are realizing that they need to place more emphasis on capacity management, says Alan Howard, vice-president of operations at Applied Computer Research, Inc., a capacity management research firm in Phoenix.

Companies currently involved in capacity management are a rare breed, according to Howard, who says the function is primarily the preserve of large corporations — ones that use an IBM 4381 machine or larger.

"There are few companies doing capacity planning of any kind — perhaps 25% of the marketplace," Howard says. "Of those, only a small percentage are doing any sort of integrated, well-thought-out capacity management."

Capacity management is an umbrella term that includes two smaller components: performance management and capacity planning. While performance management is concerned with the short-term activities necessary to keep daily machine operations acceptable to users, capacity planning deals with strategic planning activities that ensure system resources will be adequate to support the needs of the customer base.

The reason people are slow to move toward capacity management, Howard says, is that it involves two things they don't like to deal with: change and money.

"Capacity management and planning entail some organizational changes, and they also mean an economic commitment," he says. "Those are two things that MIS — already very busy — might not have the strength to deal with."

Some companies, because of economic or organizational pressures, have already been pushed into paying closer attention to future capacity needs, as well as optimizing performance on their current systems. Others can learn from these examples.

During the early 1980s, General Public Utility Service Corp. (GPU) in Reading, Pa., was on a six-year IS resource tear, notching direct-access storage device (DASD) and CPU annual compound growth rates of about 50%, according to Douglas Howe, who was then manager of performance analysis and capacity planning.

But in 1986 the buying spree came to a screeching halt at the holding firm, which provides data processing services to its subsidiaries. "TSO end-user growth exploded during [the early 1980s]," Howe explains, "and so did large-scale application development. Utilities were in a growth mode. Then, in mid-1986, the downturn in the economy caused us to switch quickly into a cost-containment phase."

GPU's IS department never saw it coming. Senior management put the IS brakes on hard and with little warning. Expenditures went one way, while user demand — still in growth mode — went the other.

Howe says he and others at GPU were ill-prepared to deal with the crisis. They had their share of performance management tools but were weak in the planning area. Until then, capacity planning was simple: You just bought more equipment.

"There was a period of hand-wringing and pain," says Howe, who is now manager of cogeneration at GPU affiliate Jersey Central Power & Light in Morristown, N.J. "We were used to growth under liberal circumstances, and now we had to deal with growth under strained conditions. We had to emphasize longer term planning, and we needed a model to help us."

Lack of role models

When GPU went looking for such models, there were none to be found in the marketplace. Instead, the company used its own ingenuity and an existing methodology borrowed from the electric utility industry. This model dealt with conservation and load management — not of IS resources but of energy use.

"We took the [energy] methodology, which deals with peak-load shaving and adapted it

Continued on page 83

Kolodziej is a free-lance writer in Lexington, Mass.

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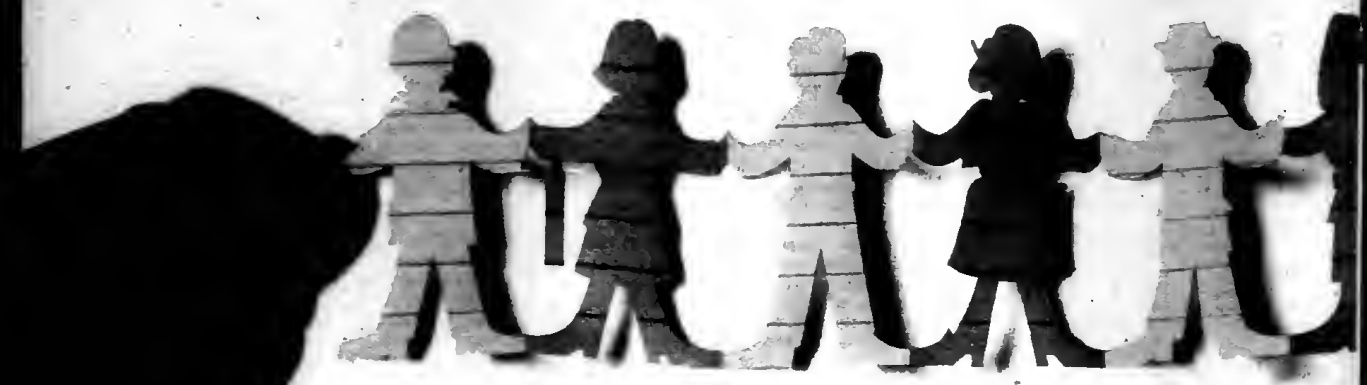


Wide-angle view

As in many areas of the computer industry, capacity management suffers from a lack of standards. In this case, it's a nonstandard terminology. Different meanings for words don't have any profound impact — until you try to communicate.

The three umbrella terms commonly used in this field are defined below by the editors of the newsletter "Capacity Management Review" and the "IS Capacity Management Handbook." Both publications are produced by the Institute for Computer Capacity Management in Milpitas, Calif.

Performance management: The short-term or tactical activities necessary to keep daily machine operations acceptable to customers. This primarily includes the following functions:
- Monitoring, analysis and tuning of the operating system, subsystems and hardware.
- Service-level agreement monitoring.
- Chargeback administration.
- Benchmark activities.
- Data collection and maintenance.

Performance management also includes many activities that support capacity planning.

Capacity planning: The long-term or strategic planning activities necessary to ensure system resources will be adequate to support the customer base. This primarily includes the following:
- Quantification of past and present computing activities.
- Work-load characterization and forecasting.
- Prognostication of business plans.
- Sizing of new applications.
- Development of capacity forecasts and alternative plans.
- Modeling.
- Service-level negotiation.
- Acquisition recommendations.

Capacity management: The functions necessary to ensure adequate data processing support are provided at a reasonable cost. They include both performance management and capacity planning functions.

Continued from page 81

to our IS situation," Howe explains. In IS terms, peak-load shaving meant asking users to reschedule some of their data processing work from the peak throughput hours of 9 a.m. to 11 a.m. and 1 p.m. to 3 p.m. They then developed time-of-use billing programs to track savings accrued by the rescheduling.

GPU found this process necessary because most job scheduling programs on the market track larger applications, such as payroll, that run on a regular basis. Many GPU users were used to requesting smaller, more irregular jobs at the last minute. These more unpredictable requests were eating through computer resources.

While this solved the immediate problem of reserving capacity and day-to-day performance management, Howe says, capacity planning at GPU is still not as extensive as it could be. GPU does have some homegrown applications that can grab performance statistics and do some capacity modeling, however.

Capacity planning efforts are being steered away from mainframes and toward personal computers, as the company starts to off-load some processing and application development onto smaller machines in a local-area network configuration.

"Network management is now one of the top planning considerations at GPU," Howe says.

Curb spending

The economic downturn — as well as a change in Bankers Trust's business strategy from commercial/retail to global markets — put pressure on the bank's IS department to flatten its expense growth curve in the late 1980s, Becker says.

The department decided in December 1988 that the best way to slow expense growth was to consolidate its two production data centers and one check processing facility into one large production site and a remotely run development center that also serves as a disaster recovery site.

The merge was completed about one year later. Thanks to the move, Becker estimates, the expense curve has slowed to the tune of $50 million over a period of 10 years. While he did need to upgrade an IBM 3090 Model 400 E to a J model, Becker says the consolidation slowed down purchasing and put the company on a "strategic leverage path."

"NETWORK management is now one of the top planning considerations at GPU."

DOUGLAS HOWE
GPU

Such savings could not have been reaped were it not for a change in the way the bank approaches performance management. A simple way to sum up that change, Becker says, is to call it "proactive" rather than "reactive."

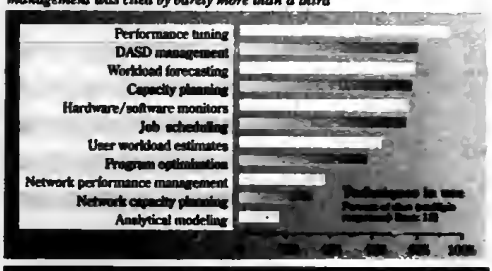
Performance management became an issue was right before moving the stand-alone check processing facility into a shared environment in the production center. "It was extremely important to maintain a high degree of [system] availability as well as a reasonable level of performance," Becker says.

The issues didn't change much once the merger was

Continued on page 85

Tools and techniques

Whereas almost all of the sites surveyed say they tune performance, network management was cited by barely more than a third



Source: Institute for Computer Capacity Management

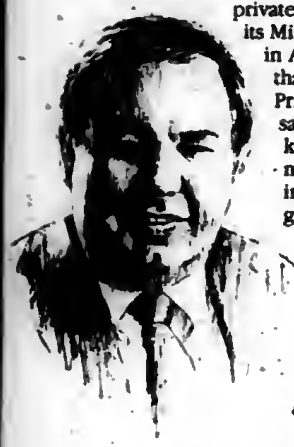
CW Chart: Doreen St. John

"Computerworld delivers high quality candidates on a very effective cost-per-hire basis."

Eric Butlein
Principal
Computer People Unlimited, Inc

Richard Weiss
Principal
Computer People Unlimited, Inc.

The largest software services consulting firm in Wisconsin, Computer People Unlimited, Inc. (CPU) is also listed in *Inc.* magazine as one of the fastest growing privately held companies in America. Together, its Milwaukee headquarters and branch offices in Appleton and Madison employ more than 250 professionals. During 1989 alone, Principals Eric Butlein and Richard Weiss saw the firm hire 98 new consultants. To keep pace with its rapid expansion and maintain its low employee turnover, CPU implements a rigorous recruitment program to hire the right professionals for every position.



Richard Weiss

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"Computerworld *delivers high quality candidates on a very effective cost-per-hire basis. Back in 1988, for example, a client had a specification for six very specialized professionals. There was no question — we needed* Computerworld's *powerful reach. In the end, at least two of these positions were filled with applicants generated by* Computerworld. *Because of its proven success,* Computerworld *is the only trade publication we use on an ongoing basis as part of our well-rounded recruitment program."*

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complete. "When the data centers were two distinct sites, they were smaller, and it was easier to maintain a reasonable level of performance," Becker says. "Because of the size of the new production facility, we have to make sure we stay on top of performance levels of the system."

None of this entailed purchasing new and exotic tools, however. Instead, the operators dug deeper into the existing tools.

"We had been using tools like Omegamon to half their capabilities," Becker says. "Quite honestly, [the consolidation] forced my operations staff to get closer to [performance management] products and understand what they can do for them. We were discovering new facilities all along the way, such as understanding all the levels of channel utilization to see where jobs are backed up."

In the larger consolidated site, for instance, Becker has an infrastructure in place that consists of two parts. First, operators no longer wait for a slowdown to occur; rather, they check the system via Omegamon at peak stress levels to deter bottlenecks. Secondly, alert levels are set at a higher tolerance so that problems are triggered earlier in the process.

The bank also uses IBM's Service Level Reporter and homegrown tools developed with SAS Institute, Inc.'s SAS programming language to produce reports on a daily, weekly and monthly basis.

"We use Omegamon to look at channel utilization during peak on-line processing," Becker explains. "On a daily basis, we use Service Level Reporter to look at trends on channel, CPU and memory to better understand that when you're approaching certain thresholds, you can preempt any kind of adverse event from happening."

Tuning, testing and modeling in the VM environment is made difficult by a lack of tools, Becker says. When he needed to merge the check processing system with the production facility, the bank used Smart, a VM modeling package from IBM that it was pilot-testing.

"We didn't find it to be nearly as user-friendly or robust as Omegamon MVS," Becker says. The bank is currently evaluating Candle's recent release of Omegamon VM.

For the near future, Becker says he is looking into tools such as automated console operators. The bank is evaluating Candle's AF/Operator as well as Outbound's message-handling system, Votek.

Becker is also becoming interested in modeling tools such as BGS Systems, Inc.'s Best/1 in order to move beyond performance management to more forecasting functions.

"I WAS TOLD I needed to provide quality service yet operate within some high utilization levels."

MIKE DELVECCHIO
TRAVELERS

"We're looking at forecast tools now, but we're not sophisticated enough to take full advantage of them yet," Becker says. "By early '91, we'll be ready."

Start doing

Most firms find that they hit a wall in terms of how much the products can help them. At some point, they find, you have to turn from products to process.

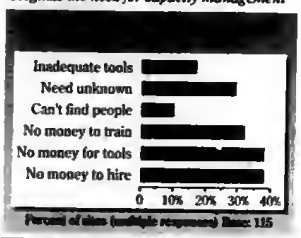
At The Travelers Corp. in Hartford, Conn., Mike Delvecchio, technical director of data processing, was given the task of taking CPU utilization from the 70% range to 85%.

"I was told I needed to provide quality service yet operate within some high utilization levels," Delvecchio says. "The way to do that is not straightforward." First, he says, you need to understand what is critical for the optimization process. "You can look at any one

Continued on page 88

What's stopping you?

In nearly one-third of the large and medium-size sites surveyed, management does not recognize the need for capacity management



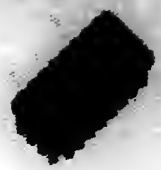
Source: Institute for Computer Capacity Management — CW Chart. Doreen St. John

Close-up

Within the capacity planning and performance management functions, the Institute for Computer Capacity Management also defines subfunctions:

- **Performance monitoring and analysis.** To track computing activity, collect data in a performance database and analyze the data to identify bottlenecks, operating problems or problem applications.
- **Performance tuning.** To adjust operating parameters for the operating system and subsystems, balance work loads and adjust hardware configuration.
- **Work-load characterization.** To classify the total work load into a set of classes so that the resource consumption of each class can be more accurately predicted.
- **Work-load forecasting.** To combine existing work-load resource requirement data with the estimation of new work loads to predict future work-load demand.
- **DASD management.** To monitor, analyze and tune disk-storage devices through DASD configuration parameters, data set placement and manipulation and hardware configuration.
- **Modeling.** To analyze the impact of a variable on a system through discrete event simulation or analytical methods.
- **Job accounting and charge-back.** To track resource use by customer classification, compute rates and bill customers.
- **Software performance engineering.** To address performance and capacity issues early in the application development phase.
- **Service-level management.** To negotiate and document an agreement between IS customers and IS, relative to the service that will be provided. To subsequently monitor and report service relative to the agreement.
- **Management reporting.** To formulate and distribute graphic, tabular and written reports to various levels of management covering issues relating to performance and capacity.

Printers



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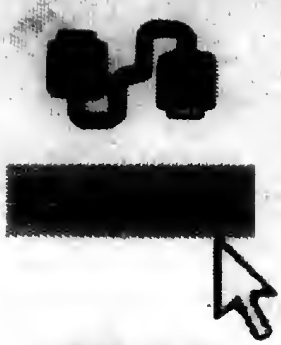

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Continued from page 85

transaction as being a combination of CPU, I/O and memory use." You optimize the important ones, he says.

Delvecchio used degradation analysis tools such as Best/1, Strobe from Programart in Cambridge, Mass., and Omegamon. Best/1 parses a job into its component parts, telling the operator which I/Os are critical to response time.

Strobe was used for highly detailed degradation analyses of on-line and batch applications. The tool looks at the life of a job for a specified time interval and reads out where time is being spent — for example, where memory is being executed, which data sets are in I/O and how much CPU time is being used and where.

Delvecchio and his staff went from site to site, working with programmers to determine which applications were causing delays and where. He used Omegamon as well as programs written in-house that scan output from Legent Corp.'s Mix database to check for trends and anomalies.

The end result was not only an increase in CPU utilization, Delvecchio says, but also savings in deferring machine acquisitions.

He emphasizes, however, not just the tools but the plan behind them. "Tools are immaterial without theory," he says. "If you look at what really makes sense from a throughput perspective, you've got to define the set of processes that describes the most critical computer job type."

In his current search for performance management tools in a distributed LAN-based environment — such as degradation analyzers, remote communication vehicles and other problem detection and repair mechanisms — Delvecchio is coming up empty-handed.

"Distributed technology and computing is mission-critical for us," Delvecchio says, "but it looks like a lot of the distributed performance management work is going to be handled internally until vendors come out with the tools."

Others who have been there and back agree that while tools are important, the way you use them is equally so. "Performance and tuning is both an art and a science," Becker says. "The science piece is the logic and the programmers. The art is the creativity around it that makes the system hum." •

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BUYERS' SCORECARD

The Monitor eases into first for MVS tracking

BY MICHAEL L. SULLIVAN-TRAINOR
CW STAFF

When it comes to software, what a product does is often secondary to how it does it. This is especially true in performance monitoring, where collecting operating system information is only half the battle. The rest is making the data useful.

This reality is reflected in the fact that four of the six product measures ranked highest in importance by respondents to *Computerworld*'s Buyers' Scorecard on real-time MVS performance monitors highlight ease-of-access and ease-of-use issues.

So it is that a product such as Candle Corp.'s Omegamon, which is the market leader in performance monitoring, can achieve the highest score for buyer satisfaction in what users say is the the most important information collection area and the most important of all criteria — the ability to isolate bottlenecks — and still miss the top slot.

Responses from 50 users of each of the following products were included in the survey. Each user group rated only its own products: Candle's Omegamon for MVS, Landmark Systems Corp.'s The Monitor for MVS, Boole and Babbage, Inc.'s Resolve Plus and IBM's RMF Monitor 2.

Landmark's The Monitor received the highest score overall based on gaining the best marks in areas that reflect how useful the information is to the organization. These include effective on-line real-time reporting and overall ease of use. In addition, Landmark topped key information collection categories such as measuring service levels and resource use. Landmark also scored the highest in affordability.

Boole and Babbage's Resolve Plus placed second — only 1.8 points behind. Omegamon's tally placed it four points below the leader. IBM's RMF 2 came in a distant fourth, a full 12 points behind The Monitor.

The Monitor was the first product to offer ease-of-use features such as "point and shoot," which allows users to select any field to get more detailed information without knowing the precise field data.

Candle has recently upgraded Omegamon to include the point-and-shoot feature. Users who responded to the survey include a mixture of those using new and old versions. Resolve Plus made a strong showing across the board. In addition to tying with Omegamon in providing accurate CPU data, it was rated first in report generation and data extraction. It also garnered high ratings for integration with other Boole and Babbage products.

RMF 2 placed last in all but two of the 16 areas surveyed, reflecting users' concerns about the difficulty in using the product to generate the information they require. However, it did edge ahead of Omegamon in the cost category and placed second before The Monitor in integration with capacity planning software.

Total scores were derived by multiplying the ratings each user group gave its own product by the importance factors all users assigned to each of the 16 criterion. (See methodology next page.) ●

COMPUTERWORLD BUYERS' SCORECARD

Real-time MVS performance monitors

Total scores reflect all criteria and their user-assigned importance
Response base: 50 users per product

Product	Three highest ratings	Three lowest ratings
Landmark Systems Corp.'s The Monitor for MVS SCORE 58.5	Overall ease of use On-line real-time reporting Accuracy of CPU data	Integrating with other monitors Integrating with capacity planning software Interfacing to other software
Boole and Babbage, Inc.'s Resolve Plus SCORE 56.7	Accuracy of CPU data On-line real-time reporting Service and support	Integrating with other monitors Interfacing to other software Ability to measure service levels
Candle Corp.'s Omegamon for MVS SCORE 54.1	On-line real-time reporting Accuracy of CPU data Isolating bottlenecks	Integrating with capacity planning software Integrating with other monitors Acquisition and maintenance costs
IBM's Resource Management Facility (RMF) Monitor 2 SCORE 45.9	Service and support Accuracy of CPU data Monitoring resource use	Effective Help facilities Flexible user interface Integrating with other monitors

KEY RATINGS

Landmark's The Monitor achieves the highest score on four out of six key ratings. Candle's Omegamon edges ahead in the most important factor – isolating bottlenecks. Boole and Babbage's Resolve Plus ties with Omegamon for first in providing accurate CPU data.

8.9 Ability to isolate bottlenecks

Omegamon	8.4
The Monitor	8.3
Resolve Plus	7.5
RMF	5.7

8.8 Accuracy of CPU data

Resolve Plus	8.5
Omegamon	8.5
The Monitor	8.4
RMF	7.6

8.7 Quality of service & technical support

The Monitor	8.3
Resolve Plus	8.2
Omegamon	8.2
RMF	7.8

8.6 Effective on-line real-time reporting

The Monitor	8.7
Omegamon	8.6
Resolve Plus	8.3
RMF	6.2

8.3 Ability to monitor resource use

The Monitor	8.4
Omegamon	8.3
Resolve Plus	8.0
RMF	6.8

8.1 Overall ease of use

The Monitor	8.7
Resolve Plus	8.2
Omegamon	7.2
RMF	5.6

A CLOSER LOOK

Boole and Babbage and Landmark split the remaining categories with Resolve Plus showing strength in reporting capabilities and integration and The Monitor winning price, user access and interfacing categories. Candle and IBM battle for third with Omegamon taking most of the third-place rankings

Top importance rating

7.9 Usefulness of reports

Resolve Plus	7.5
The Monitor	7.4
Omegamon	6.9
RMF	6.7

7.7 Reasonable acquisition and maintenance costs

The Monitor	8.2
Resolve Plus	7.2
RMF	6.1
Omegamon	5.9

7.5 Ability to measure service levels

The Monitor	7.8
Omegamon	7.5
Resolve Plus	6.7
RMF	5.7

7.3 Flexible user interface

The Monitor	7.8
Resolve Plus	7.3
Omegamon	7.0
RMF	4.9

7.2 Effective Help facilities

The Monitor	8.2
Resolve Plus	7.2
Omegamon	6.9
RMF	4.7

7.1 Ease of report generation

Resolve Plus	7.1
The Monitor	6.8
Omegamon	6.3
RMF	6.2

7.1 Data extraction capabilities

Resolve Plus	7.6
The Monitor	7.2
Omegamon	6.0
RMF	5.8

6.4 Integration with capacity planning software

Resolve Plus	6.9
RMF	6.3
The Monitor	5.9
Omegamon	5.2

5.8 Effectiveness of interfaces to other software

The Monitor	6.6
Resolve Plus	6.5
Omegamon	6.2
RMF	5.1

Loyalties

Would you buy the product again?

(Reasons based on most frequently stated responses)

The Monitor

Response base: 50

50 — Number of respondents

Likely
The reason: Ease of use

Resolve Plus

Response base: 49

43 — Number of respondents

Likely
The reason: It meets our needs

6 — Number of respondents

Unlikely
The reason: Better products are available

Omegamon

Response base: 50

44 — Number of respondents

Likely
The reason: Good product

6 — Number of respondents

Unlikely
The reason: Not as user friendly as it could be

RMF

Response base: 50

41 — Number of respondents

Likely
The reason: Provides data we need

9 — Number of respondents

Unlikely
The reason: Difficult to use

Verbatim

What do you like best/least about this product?

(Responses are based on the most frequently stated answer)

The Monitor

Likes

Ease of use
Good price, low overhead price
Menu-driven user interface

Dislikes

Report writing feature delayed
Expanded batch reporting not delivered
Lack of connectivity to other products

Resolve Plus

Likes

Ease of use
On-line reporting capabilities
Good for identifying and fixing problems

Dislikes

Documentation and manual
Slow to keep current
Interface to other capacity planning products

Omegamon

Likes

Determines source of bottlenecks and lockups
Provides comprehensive picture of what's going on
Pinpoints problems quickly in real time

Dislikes

Lack of ease of use
It's s technician's tool
Tough learning curve

RMF

Likes

Support from IBM
Provides broad base of data
Reliable

Dislikes

Not user-friendly
Lack of flexibility
Documentation and manuals

Vital statistics

(Response base of 200; multiple responses allowed)

Who responded:

Operations Manager	134
IS Manager	64
Other	2

Length of time using these products:

Less than one year	52
Two to three years	47
Four to five years	25
More than five years	76

Operating system used:

MVS	26
MVS/XA	108
MVS/ESA	79

CW Charts: Paul Mock

METHODOLOGY

Products rated in *Computerworld*'s Buyers' Scorecard on real-time MVS performance monitors were selected on the basis of vendors' installed base and revenue shares within that market segment.

The survey was conducted by telephone interviewers at First Market Research located in Austin, Texas. A minimum of 50 users was required for each product. Results tabulation was conducted by IDG Research Services in Framingham, Mass.

Total weighted scores were computed by multiplying the mean scores all users assigned to the importance of each criterion by the mean scores each user group gave to its own product.

RESPONDENT PROFILE

Survey respondents use the following equipment: large-scale 3090, 32%; medium-scale 3090, 17%; small-scale 3090, 11%; large 308X, 8%; medium 308X, 6%, small 308X, 1%; large Amdahl Corp. mainframe, 6%; medium Amdahl, 2%; large Hitachi Data Systems Corp., 2%; medium HDS, 2%.

Fifty percent of the respondents also say they use other performance software from the same vendor. According to three-quarters of the 200 respondents, their use of the performance monitors has enabled their organization to make changes to improve equipment use. The 25% who did not make changes gave the following reasons: The monitor is difficult to use; the package is used for problem determination rather than planning; other software is used to address usage issues.

Fifty-seven percent of the respondents say that monitoring is very important to their business. Thirty-eight percent say it is somewhat important, and 4% say it is not very important.

Twenty-two percent of the companies surveyed have annual revenues in excess of $1 billion. Sixteen percent of the companies are in the manufacturing industry, 13% are insurance companies, and 11% are government agencies.

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A little bit of knowledge isn't that hard to come by

BY MARY LOU ROBERTS

Expert systems — or at least knowledge-based techniques — are cropping up in the plans or products of almost every developer of performance management or capacity planning tools.

This trend is likely to continue as hardware and software configurations become more diverse and complex and processing speeds increase. In fact, some observers say that expert systems may well hold the only answer to effective performance management on future systems.

"For computer operations and management, problem solving and decision-making will become automated just as surely as production lines will," says Bernie Domanski, president of Domanski Sciences, a consulting firm in Freehold, N.J.

While only a small number of products today conform to a strict definition of expert systems (see story page 93), many users say they have already saved manpower and money using current tools.

James Hayes, senior systems programmer at Huntington National Bank in Columbus, Ohio, has used Boole & Babbage, Inc.'s DASD Advisor for about two years. "It'a worth somewhere from one part-time to one full-time DASD expert to us that we couldn't afford to hire."

The DASD Advisor I/O subsystem performance manager is one of the few true expert systems-based products on the market, incorporating technology from Aion Corp. The product does performance analysis and planning in direct-access storage device (DASD) environments. When it detects problems with I/O, it interprets the problem, poses an explanation and suggests a response.

"Anyone can do data collection; it'a how you use and interpret the data that's the hard part," Hayes says. While a human interpretation of data is subjective and possibly inconsistent, DASD Advisor allows the company to measure improvements on a consistent basis.

Roberts is a free-lance writer in Glenside, Pa.

According to Hayes, the bank is preparing to install Boole & Babbage'a new DASD Impact Advisor, a modeling component that will let the company look ahead to see the full impact of the changes it plans to make in its I/O configuration.

"Before, our decisions were often wrong and frequently degraded some applications. Now we will be able to make changes with 90% assurance that the changes will be the right ones," Hayes says. The bank is also looking forward to Boole & Babbage's DB2 Advisor and MVS Advisor.

BGS Systems, Inc.'a Best/1-MVS is a knowledge-based — but not true expert system — tool that does perform in those two environments. A recent release of a modeler — called Calibration Consultant — is also rule-based and aids in modeling and calibrating IBM MVS work loads. Calibration Consultant interactively presents the user with a methodology for completing the modeling steps and offers prioritized suggested approaches.

Michael Doyle, senior capacity analyst at Purdue University in West Lafayette, Ind., says the tool has been a big time-saver. "This is a good tool for someone like me who doesn't do modeling very often because it'a easy to forget what the right steps are," he says. During the modeling process, he adds, "If you pursue one option and you don't like the results, you can quickly back out of it and try another."

BGS Systems is expected to announce the Best/1-DASD Consultant later this year. This product is expected to provide reporting, tuning and modeling at the device, data set and work-load levels.

Los Angeles-based Candle Corp. plans to incorporate true expert systems technology into its Omegamon product line late this year with AF/Performer.

AF/Performer will initially focus on solving 10 common performance problems, ranging from MVS cross-system reserve lockouts to IBM CICS high CPU use to DB2 thread lockouts. It complies completely with the recent IBM announcements, according to Robert Sackett, product manager at Candle.

The next stage, Sackett says, is for the product to monitor service levels. "If the user isn't meeting response time requirements, we'll be able to tell why."

According to Robert Berry, a research scientist at IBM'a Thomas J. Watson Research Center in Yorktown Heights, N.Y., IBM is doing a significant amount of prototyping in using expert systems for performance tuning. The recently announced IBM Performance Analysis Facility/VM, a reporting tool that incorporates statistical techniques for detection and diagnosis of performance problems, is a sample of the tools IBM is expected to announce.

Other vendors offering knowledge-based tools include the following:

- Goal Systems International, Inc. in Columbus, Ohio, markets the Explore family of products, which monitors performance of MVS, VSE and VM systems; Insight for DB2, which manages the performance of DB2 systems; and CICS/Express, which tunes internal aspects of CICS to achieve optimum response time.
- Computer Associates International, Inc. in Garden City, N.Y., offers CA-Mindover, an expert technology-based system that conducts performance and capacity management in the MVS environment and the CA-ISS/Three capacity management system.
- Legent Corp. is planning to build expert systems technology from AI Corp. into Netspy Assistant, a technical support tool for its Netspy product. •

Price guide

• BGS	Best/1-MVS	Modular pricing $14,000 to $72,000
• Boole & Babbage	DASD Advisor	Tiered pricing $18,750 to $30,940
• Candle	AF/Performer	Tiered pricing $20,000 to $60,000
• Goal Systems	Explore MVS	$16,000 to $24,700
	Explore VSE	$16,000
	Explore VM	$10,200 to $15,600
	Insight DB2	$10,800 to $35,000
	CICS/Express	$25,000 to $39,000
• Legent	Netspy	$13,860+
• CA	CA-Mindover	Tiered pricing $26,000 to $71,000
	CA-ISS/Three	$36,800

Where expert systems help and hurt

What's the difference between having knowledge and being an "expert"? In the sphere of information systems, there's a major one.

According to Robert Berry, a research scientist at IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., a true expert system product meets the following three requirements:

- It must incorporate a knowledge base that encodes expert knowledge, or rules, and is separable from the processing function.
- It must include an inference engine that coordinates the application of knowledge-based information.
- Its system memory must contain problem data used for inter-rule communications.

Most vendors' performance management tools do not meet these criteria. The question is, do they have to in order to deliver a useful tool?

The vendors say no. "You can implement expert systems-type technology without the use of an inference engine and have an excellent product," says Robert Sackett, product manager at Los Angeles-based Candle Corp. "If you can analyze a problem, devise a solution, implement the solution and validate the results, then you have a knowledge-based system."

Other industry observers agree that there are advantages to not incorporating an expert system shell in a performance management product. "Expert systems are not known for their speed," says Bernie Domanski, president of Domanski Sciences, a consulting firm in Freehold, N.J. "The interpretation of performance measurement data in real time could take a prohibitive amount of time, nullifying the usefulness of the system."

This use of system resources may account for the fact that true expert systems are more often applied to capacity planning and modeling tools than to real-time performance management.

"Model calibration and configuration capacity planning ... are longer-term issues than performance management, which tends to be a more pressured 'fire fighting' type of situation," Berry says.

Slow to move

Even proponents of expert systems acknowledge that users are reluctant to turn the real-time performance tuning of their systems over to automated tools. No matter how much these systems may become capable of doing, users are likely to insist, at least for a while, on holding onto direct control of performance changes.

"What expert systems will do in the near term is intelligent analysis of the data — not turning the knobs," Domanski says. "People are new to the idea of having the systems tune themselves. They first want to understand how it works."

The issue of user acceptance may be more than just lack of faith and understanding in the tools. "In the real world," Berry says, "the people who do the performance analysis are not necessarily the people who have the authority to change the system. For now, it makes more sense to automate some portions of the process and then let the tool serve as an aid for letting people solve the rest."

Looking ahead, observers say that many of the "expert" capabilities for real-time performance management will eventually be built right into the operating systems by the hardware vendors themselves.

This is already beginning to happen on IBM's recently announced ESA/390 operating system, which includes many built-in expert performance techniques.

"Mainframe vendors will also begin to build knowledge bases into their front ends," according to Domanski. "It's going to be a true interactive Help facility rather than a more static one like we see today." •

MARY LOU ROBERTS

Few tools capture full network picture

BY ALLEN G. TAYLOR

When an organization wires personal computers and workstations into a local-area network configuration, the last thing it expects is slower access and response times. Finding and fixing bottlenecks on a network isn't easy, however; the job is at least an order of magnitude more complex than doing the same on stand-alone machines.

The biggest problem is that no one tool gives you a window into the entire network. For a complete overview and analysis of network activity — especially in large LAN or wide-area network configurations — you need to think more in terms of a crowd.

"Local-area network management and optimization are very much an art rather than a science because you are dealing with multivendor environments," says Cheryl Currid at Coca-Cola Foods in Houston. "There is no one tool that can tell you everything."

There are tools that can tell you "almost everything," however, depending on the level of detail you require.

If your network supports fewer than 100 users and doesn't perform network-intensive tasks such as database retrievals, software-only performance monitors may be sufficient for your needs.

Typically priced at only a few hundred dollars, these monitors provide a less-detailed analysis than hardware/software protocol analyzers. They monitor network resources, collect statistical node and traffic information, run connectivity requests and provide a picture of the internet.

This information sufficiently resolves most problems on small networks and can also be valuable on larger networks in combination with other tools.

Most of the software-only packages are designed to run under Novell, Inc.'s Netware, currently the most popular PC network operating environment.

One of the most capable products in this class is Cheyenne Software's Monitrix, which was introduced a year ago. The package provides a graphical display of network topology and everything connected to it, including bridges, servers and workstations, while continuously monitoring network resources.

Monitrix is a value-added process (VAP), meaning that it follows Netware specifications to run continuously in the background during network operation. As a result, it is not necessary to dedicate a workstation to the monitoring and statistics-gathering functions.

Monitrix Release 2.0, just introduced this year, adds artificial intelligence functionality that goes beyond problem analysis to suggesting solutions. The package costs $795 for a configuration that supports up to four servers.

Fresh Technology in Gilbert, Ariz., has started shipping Netvision, a network analysis tool with a different emphasis from that of Monitrix. At $495, it provides the budget-conscious network administrator with a detailed view of CPU, cache and disk efficiency in both graphical and spreadsheet form. As a VAP, it can also run as a background function to gather long-term statistics.

There are fewer software-only performance monitors for the Unix environment. In addition, tools that run on workstations under VMS or Unix tend to be more expensive than comparable tools that run under Netware on PCs.

One that just came out seven months ago is Santa Clara, Calif.-based Aim Technology, Inc.'s Aim Network File Manager (NFM), which runs on Sun Microsystems, Inc. workstations. Priced at $6,500, NFM monitors file-server throughput, diagnoses topology-related problems and manages the use of disk storage.

Tool combinations

Generally, tools that include hardware extract more detailed information from the network but for a higher price than their software-only counterparts.

Software-only tools have network adapters designed to filter out faulty data packets, thus losing valuable diagnostic information. With a hardware/software combination tool, the adapters capture that faulty data and thus provide a better picture of the network.

These products can also alert the administrator to undesirable trends before they affect performance. The administrator can then act to prevent a system slowdown without users being aware that anything is out of the ordinary.

Representative of the combination hardware/software products running under Unix is FNMP-based Lance from Micro Technology in Anaheim, Calif., which has been available for about eight months.

A single Lance/Tap card can be plugged into a PC and then hooked up to a LAN segment to gather and report on detailed activity data. It also provides general information about the network as a whole. When additional Lance/Tap monitors are installed on other network segments, the administrator can gain a detailed view of activity on the entire network through a single console.

Lance is geographically unlimited in its ability to monitor: It sees through bridges, routers and T1 multiplexers to give the network administrator a picture of the entire internetwork.

The software component — Lance/NMS — is priced at $15,000, and each Lance/Tap card costs $3,500 in quantity purchases.

Another network manager for Unix-based T1 networks is the Digital Link Network Management System (DLMS) from Digital Link Corp. in Sunnyvale, Calif.

Using boards installed in workstations, the DLMS retrieves performance data and error reports and runs diagnostic tests from a central control site. A database contains the network configuration, historical performance data and alarm conditions. A basic DLMS software package, priced at $17,600, can handle up to 10 T1 links.

There is as much diversity in the DOS, OS/2 and Netware worlds as in Unix. Novell's Lanalyzer products — which serve as both protocol analyzers and network monitors — are available for Ethernet and Token-Ring networks.

The first Lanalyzer was introduced four years ago. The latest release includes an application test suite, an on-line troubleshooting guide and a Help system.

The Help system not only guides the administrator in running the tests but also helps him interpret the results and suggests possible actions to take. A Lanalyzer kit consists of software and a network interface card that plugs into any IBM Personal Computer AT on the network. The kit costs $9,980 for Ethernet or Token-Ring versions.

Network General Corp. in Menlo Park, Calif., manufactures the Sniffer family of network analyzers, which supports more network hardware platforms than any other vendor.

The company also supplies a wide array of protocol interpreters, including IBM's Systems Network Architecture, Netbios, OS/2 LAN Manager, Netware, XNS/MS-Net, Transmission Control Protocol/Internet Protocol, Sun's Network File System, ISO, Simple Network Management Protocol, Digital Equipment Corp.'s Decnet, Banyan Systems, Inc.'s Virtual Networking Software, Apple Computer, Inc.'s Appletalk and X Window System.

Sniffer consists of a PC specifically configured for network analysis and all associated software. It ranges from $16,750 to $24,000 for a base model.

Network General recently introduced a 16M/4M bit/sec. Token-Ring Sniffer analyzer ($18,750) that is based on the IBM Personal System/2 Model 70. ●

Taylor is a lecturer, writer and systems consultant in Westminster, Calif.

Detail work

For inexpensive, "quick-fix" views of network performance, there is also a variety of add-on utilities that fix their sights on specific aspects of network performance.

For $179, Fresh Technology's Fresh Utilities reports on such things as bindery information, drive use and file server active user groups.

TXD from Thomas Conrad monitors LAN performance, alerts the administrator to problems and suggests a solution. The product costs $195.

TXD is slightly more than a year old, and, like most of the products in this category, is able to see through bridges to segments of the network other than the one on which it is running.

Other entries in this arena include Fry Computer Systems' Fry Utilities at $495 and Emulation Technologies' Net Companion at $349.

Job scheduling tools

VENDOR	PRODUCT	HARDWARE ENVIRONMENT	OPERATING SYSTEMS SUPPORTED	JOB SCHEDULING FUNCTIONS PERFORMED	POTENTIAL PROBLEMS FOR WHICH WARNINGS ARE ISSUED	ACTUAL PROBLEMS FOR WHICH OPERATORS ARE ALERTED	ERROR HANDLING FUNCTIONS	TYPES OF OVERRIDE COMMANDS	ALLOWS ONE-TIME SCHEDULING CHANGES	REPORTING CAPABILITIES	INTERFACES WITH ON-LINE SYSTEMS	COMMAND OR MENU DRIVEN	LANGUAGE USED FOR COMMANDS	SECURITY PACKAGE COMPATIBILITIES	PRICE RANGE
Advanced Systems Concepts, Inc. (708) 605-1311	Pilot	IBM AS/400, System/38	OS/400, CPF	Cancel, create dependences, generate future schedules, schedule by time	None	Incomplete and unperformed jobs	Logged	None	Yes	Distribution, on-line job status, history of jobs run	No	Menu	NA	None, uses OS security	$350-$2,480
Allen Systems Group, Inc. (800) 780-2727 (813) 263-6700	Jobnet	IBM mainframes and compatibles	MVS/SP, MVS/XA	All[1]	None	Incomplete and unperformed jobs	WTO message	Hold, release	Yes	On-line job status, history of jobs run	No	Menu	NA	None, internal security	$11,800-$16,900 for CPU license $28,400-$40,500 for use license
Altai Software (817) 640-8015	Zeke, The Scheduler	IBM mainframes and compatibles	MVS/SP, MVS/XA, MVS/ESA, VSE/SP	All, plus check condition codes	Scheduling conflicts, dormant jobs, overload	Unperformed, late and hold jobs	Reported, logged, automatic job restart	Change schedule, JCL or prerequisites	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements	Yes	Either	Proprietary	ACF2, RACF, Top Secret	$17,500-$86,900
Carlisle Systems Group (513) 746-8118	Ivan-Submit	NCR V8000 and V9000 series	VRX, VRX/E	Create dependences and multiple job queues, generate future schedules, hold jobs, schedule jobs by time and event	None	Incomplete and unperformed jobs, activity errors	Reported, logged	Any commands that would otherwise be issued automatically	No	On-line job status, pre- and post-process reports, history of jobs run, chargeback	Yes	Command	English-like	None, relies on text editor security	$3,500
Carolian Systems International, Inc. (416) 673-0400	Emperor	HP 3000	MPE/V, MPE/XL	All, plus dynamic scheduling	None	Incomplete and unperformed jobs	Reported, logged, automatic job restart	Any commands that would otherwise be issued automatically	No	On-line status, history of jobs run, post-process reports	No	Command	Proprietary	None, internal security	$2,000-$13,000
Chestnut Data Systems, Inc. (215) 557-6607	CDS/Acorn	HP 3000	MPE V, MPE/XL	Cancel and hold, create dependencies, generate future schedules, schedule by time	Dormant jobs	Incomplete jobs	Reported, logged	Stop, run	Yes	On-line job status, pre-process reports, forecasting of production requirements	No	Menu	NA	CDS/Sec Review	$2,800-$3,400
Computer Associates International, Inc. (516) 227-3300	CA-Scheduler	IBM mainframes and compatibles	MVS, VM, VSE	Cancel and hold, create dependencies, generate future schedules, schedule by time and event	None	Abends	Reported, trapped, logged, automatic job restart, user notification	Change schedule	No	On-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements	No	Either	English-like	ACF2, Top Secret	$6,060 - $109,920
	CA-7	IBM mainframes and compatibles	MVS/XA, MVS/ESA	All, plus simulate future work load, real-time work load balancing	Scheduling conflicts, dormant jobs, overload	Late jobs	Reported, trapped, logged, automatic job restart	Date, time or JCL changes	Yes	On-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements, simulation	No	Either	English-like	ACF2, RACF, Top Secret	$41,220 - $109,920
Cybermation, Inc. (415) 479-4611	Execution Scheduling Processor (ESP)	IBM 370 and compatibles	MVS, MVS/XA, MVS/ESA	Cancel and hold, create dependencies, generate future schedules, schedule by time and event, allow ad hoc changes, resource-based scheduling	Scheduling conflicts, overload	Incomplete, unperformed or late jobs, JCL errors, system messages, condition code failure	Reported, trapped, logged, recovery procedure run	Any operator and scheduling commands	Yes	On-line job status, history of jobs run, job queue, forecasting of production requirements, simulation modeling, exception and late job reports	No	Either	English-like	ACF2, RACF, Top Secret	$42,000 - $70,000
Digital Equipment Corp. (508) 480-9443	Decscheduler for VMS	DEC VAX	VMS	Cancel and hold, create dependencies, generate future schedules, schedule by time and event	Scheduling conflicts, dormant jobs, overload, expected runtime exceeded	Incomplete and unperformed jobs, user-defined problems	Reported, logged, automatic job restart	Any operating system and scheduling commands	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run	No	Either	DCL	Any VMS-compatible package	$1,767-$56,780
EDP Systems, Inc. (904) 575-0179	A S Exec	Unisys A series machines	MCP versions 3.7-3.9	Cancel and hold, create dependences, generate future schedules, schedule by time or event	Overload	Incomplete jobs	Trapped, automatic job restart	Run jobs out of schedule, hold and remove jobs	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run	Yes	Menu	NA	EDP's Infoguard and internal security	$8,300 - $25,000
	LIONL/Job Flow	Unisys V series machines	MCP versions 3.7-3.9	All	Scheduling conflicts, dormant jobs overload	Incomplete jobs	Reported, trapped, logged, automatic job restart	Parameter changes, minor schedule modifications	Yes	Distribution history of jobs run, post-process reports	Yes	Either	Unisys Operator Control Language	Internal security	$17,000 - $32,000, includes scheduling, console automation, tape management modules
Goal Systems International, Inc. (800) 829-9000	Jobtrac	IBM 4300, 3000 series, NAS, Amdahl	MVS/SP, MVS/XA, MVS/ESA	Cancel and hold, create dependences, generate future schedules, schedule by time and event	Scheduling conflicts	Abends, reruns, JCL and catalog errors, condition code violations	Reported, trapped, logged	Add, delete, purge, hold, adjust forward and backward	Yes	On-line job status, pre- and post-process reports, history of jobs run, job queues	Yes	Either	ISPF	ACF2, Alert, RACF, Top Secret	$46,500 - $84,900
	FAQS/PCS for VSE	IBM mainframes and compatibles	VSE/SP version 2 and higher	All, plus manual dependences	Scheduling conflicts, dormant, aborted and waiting jobs	Incomplete, unperformed, late and waiting jobs	Reported, logged	On-demand scheduling, override data or JCL, restart job	Yes	On-line job status, pre- and post-process reports, history of jobs run, job queue, chargeback, audit trails	Yes	Either	REXX	Alert/VSE, internal security	$8,000 - $12,000
Glosser Software (800) 634-0102	Scheduler	Wang VS	Wang OS 6 43 - 7 30	Cancel and hold, create multiple job queues, generate future schedules, schedule by time or event	Dormant jobs	Incomplete jobs	Logged	Activate, deactivate jobs	Yes	History of jobs run, job queue	No	Menu	NA	None, internal security	$300 - $960
Help Systems, Inc. (612) 933-0600	Robot	IBM AS/400, System/38	OS/400, CPF	All	None	Incomplete jobs	Reported, trapped, logged	Start and hold job, omit next run, run jobs missed due to shutdown	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run, chargeback	Yes	Menu	NA	IBM None, uses OS security	$1,750-$4,275
ISA Solutions (800) 462-6301 (708) 677-3530	ISA/Task Master	DEC VAX	VAX/VMS Version 4 7 and higher	All, plus resource-based scheduling	None	Incomplete or unperformed jobs	Reported, logged	Hold, release, start	Yes	On-line job status, pre- and post-process reports, history of jobs run	No	Either	DCL	Internal security	$1,295-$9,000
ISE, Inc. (313) 837-8330	Schedule V3.3	DEC VAX	VMS	All	None	None	Trapped	Edit, force status changes	No	On-line job status	No	Command	DCL	None	$1,100-$19,223

[1]"All" refers to the following features: cancel and hold jobs, create dependences and multiple job queues, generate future schedules, schedule jobs by time and/or event.
[2]"All" refers to the following features: distribution, on-line job status, pre- and post-process reports, history of jobs run, job queue, forecasting of production requirements and chargeback.
[3]European readers should call Boole & Babbage, Inc. in Brussels, West Germany at 32-2-725-2432.

The companies included in this chart responded to a recent survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	HARDWARE ENVIRONMENT	OPERATING SYSTEMS SUPPORTED	JOB SCHEDULING FUNCTIONS PERFORMED	POTENTIAL PROBLEMS FOR WHICH WARNINGS ARE ISSUED	ACTUAL PROBLEMS FOR WHICH OPERATORS ARE ALERTED	ERROR HANDLING FUNCTIONS	TYPES OF OVERRIDE COMMANDS	ALLOWS ONE-TIME SCHEDULING CHANGES	REPORTING CAPABILITIES	INTERFACES WITH ON-LINE SYSTEMS	COMMAND OR MENU DRIVEN	LANGUAGE USED FOR COMMANDS	SECURITY PACKAGE COMPATIBILITIES	PRICE RANGE
Isom Technology Corp. (412) 879-2817	JIS-Job Scheduling and Control System	DEC VAX	VMS	Cancel, create dependencies, generate schedules, hold, schedule by time and event	None	Incomplete jobs	Reported, trapped, logged, automatic job restart	Hold	Yes	On-line job status, post-process reports, history of jobs run, job queue, post-process reports	No	Menu	NA	None, internal security	$4,000-$15,000
Informed Management Environments, Inc. (800) 447-4687 (713) 880-4630	Operations Environment	IBM AS/400	OS/400	All, plus issue reminders	Dormant jobs	Incomplete and unperformed jobs, activity errors	Reported, trapped, logged, user-defined responses	None	No	Distribution, on-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements	No	Menu	NA	None, uses OS security	$5,000-$12,000
Maxtime Corp. (508) 948-8500	JobMaster	IBM 370, 4301, 3080, 3090	MVS/SP, MVS/XA, MVS/ESA	All, plus monitor and schedule started tasks, resolve data set contentions	Scheduling conflicts, dormant jobs	Incomplete and unperformed jobs, missed task requirements and real-time status for delays	Reported, trapped, logged, automatic job restart, real-time status for delays	Forced cancel and complete, hold, release	Yes	On-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements, user reporting	Yes	Menu	NA	ACF2, RACF, Top Secret	$39,500-$49,500
Mobius Management Systems, Inc. (914) 633-7960	Infopac-Scheduler	IBM mainframes and compatibles	MVS/SP, MVS/XA, MVS/ESA	All, plus start job after appropriate data set is available or after unscheduled job is complete, rerun, check condition codes	Scheduling conflicts, dormant jobs, overload	Incomplete, unperformed and late jobs, condition code failures	Reported, trapped, logged, automatic job restart or rerun	Adjust clock, schedule changes, manual job submission	Yes	All	Yes	Menu	NA	ACF2, RACF, Top Secret	$30,000-$60,000
Morse Software Development, Inc. (508) 468-1838	Command File Scheduler	DEC VAX	VMS	All	Scheduling conflicts, dormant jobs, overload	Incomplete and unperformed jobs	Reported, trapped, logged, automatic job restart	Parameter changes	Yes	Distribution, on-line job status, pre- and post-process reports, forecasting of production requirements, chargeback	No	Menu	NA	None, uses OS security	$2,995-$21,000
Netec International, Inc. (214) 343-9744	Auto Operator Extension Facility	IBM mainframes and compatibles	MVS, JES2, JES3	Cancel, hold, create dependencies and multiple job queues, schedule by time or event	None	User-defined problems, including abends, allocation failures, incomplete jobs	Logged	Hold, cancel, release	Yes	On-line job status	Yes	Command	REXX-like	None, uses OS security	$3,000 - $11,000
Operations Control Systems (418) 688-4132	Express	HP 3000, models XE-9X, 6X	MPE, MPE-XL	All, plus job queue management, standard for analysis, network support	Scheduling conflicts, dormant jobs, overload	Incomplete and unperformed jobs, abnormal job completion status	Reported, trapped, logged, restart sequence	Change, cancel, stop, add, override	Yes	All, plus tape, disk and printer usage, audit trails	Yes	Command	User-defined and MPE-like interface	OCS/Private, HP Security Monitor	$10,000+
Pansophic Systems, Inc. (800) 323-7335	Masterrimo/ The Operations Expert	IBM AS/400, System/38	OS/400, CPF	All, plus automatic recovery	Scheduling conflicts, dormant and late jobs	Incomplete, unperformed and held jobs	Reported, trapped, logged, automatic job restart, other jobs executed based on error found	Schedule dependences, recovery and other parameters	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements, schedule documentation	No	Either	Standard OS/400 and CPF commands	None, uses OS security	$2,500 - $10,000
Planit Systems, Inc. (408) 737-1885	The Daily Planit	Unisys 1100, 2200	Exec 8	All, plus start unscheduled jobs	Scheduling conflicts, dormant jobs, overload, facility requirements problem, uncatalogued files	Incomplete, unperformed, late and dependent jobs, time constraints, conflicts	Reported, trapped, logged, automatic job restart	Add unscheduled jobs, override dependencies	Yes	All	Yes	Either	SSG, Cobol, DPS, Tip	Unisys Sentry, Susan, TSS	$28,000-$31,000
Software and Management Associates (713) 664-5232	The Scheduler	Unisys 1100, 2200, System 80	OS 1100, OS 3	All, plus schedule for multiple computers	scheduling conflicts, dormant jobs, overload, machine time allocation by user or department	Incomplete and unperformed jobs, insufficient resources	Reported, logged, automatic job restart, recovery job automatically executed	Temporary suspension of the product, user-defined commands	Yes	All	Yes	Either	English-like	None, uses security in Unisys DPS and TIP and internal security features	$10,000-$65,000
Software Business Applications, Inc. (703) 883-4030	VSTimer	Wang VS	VS 6.43 and higher	Create dependencies, schedule by time and event	None	Incomplete jobs	Reported	None	No	On-line job status, post-process reports	No	Menu	NA	None, uses OS security	$300
Software Partners/32, Inc. (508) 887-6409	Jobsys	DEC VAX	VMS	Cancel, create dependencies, generate future schedules, hold, schedule by time	None	Incomplete and unperformed jobs, completion status	Reported, automatic job restart if system goes down	Override scheduling	No	History of jobs run	No	Either	DCL	Any VMS-compatible packages	$2,500-$10,000
Star Task Software (312) 940-8000	Auto-Answer	IBM 370	VSE, VM	Cancel and hold, create dependencies, schedule by time or event	None	None	Reported, automatic job restart	None	No	On-line job status	Yes	Menu	NA	ACF2, RACF, Top Secret	$4,500-$6,500
Systems Center, Inc. (703) 264-8080	VMBatch/ VMSchedule	IBM, Amdahl mainframes	VM/SP VM/HPO, VM/XA Version 2.1	All	Dormant jobs	Incomplete jobs	Reported, trapped, logged, automatic job restart	None	Yes	On-line job status, history of jobs run, chargeback	Yes	Either	Internal command language	ACF2, RACF, VM Secure	$7,000-$46,500
Tandem Computers, Inc. (408) 285-6000	Netbatch-Plus	Tandem Nonstop Cyclone, VLX, CLX	Guardian 90	All	None	None	Reported, trapped, logged, automatic job restart	Change dependencies and schedule, start and stop job	Yes	On-line job status	Yes	Either	Tandem TACL and BPROC	Tandem Safeguard	$1,095-$6,550 stand license fee, plus $130-$510 per month
Telmi Systems, Inc. (313) 455-8755	PBase	Datapoint machines	DOS, RMS	All	None	Missing files	Reported, job stopped	Hold, change parameters	No	On-line job status, history of jobs run	No	Command	Databus	None, uses OS security	$2,000
The 68/HX Group (800) 289-4680 (800) 475-8720	Lights Out/400	IBM AS/400, System/38	OS/400, CPF, SIF	All	Overload	Incomplete and unperformed jobs	Reported, logged	Hold, change schedule and JCL	Yes	All, plus report shell to allow mapping to other reporting packages	Yes	Either	RPG/400	None, uses OS security	$1,495-$2,495
Tone Software Corp. (800) 833-8663 (714) 991-8460	Control-M®	IBM mainframes and compatibles	MVS, MVS/XA, MVS/ESA	All, plus schedules based on resource requirements, file availability, CICS status	Scheduling conflicts, dormant and late jobs, overload or condition codes, abends, JCL errors, uncatalogued conditions	Incomplete and unperformed jobs	Reported, trapped, logged, automatic job restart, audit trail	Hold and free jobs, change schedule, suspend processing	Yes	Distribution, on-line job status, pre- and post-process reports, history of jobs run, forecasting of production requirements, JCL checking, tape pull list, job and resource simulation	Yes	Menu	NA	ACF2, RACF, Top Secret	$29,000 - $59,000
Unison Software (408) 252-0909	DCM/Pak	HP 3000	MPE/V, MPE/XL	All, plus control multiple CPUs	Scheduling conflicts, dormant jobs, overload, security violations	Incomplete and unperformed jobs	Reported, logged, automatic job restart	Cancel, rerun, release	Yes	Any that run on Hewlett-Packard machines	Yes	Either	Proprietary MPE-like	All	$7,500-$40,000
Unitech Software, Inc. (703) 264-3301	Uqueue	Unix machines	Unix and variations	Cancel and hold, create multiple job queues, schedule by time	None	Incomplete and unperformed jobs	Reported, logged, automatic job restart	Change schedule, redirect jobs to different printer	Yes	On-line job status, pre- and post-process reports, history of jobs run, chargeback	No	Either	C	Unitech's Unecure	$1,000-$4,000

Get it together, IBM

A once-unified Big Blue must consolidate its operating systems and architectures to thrive past the 1990s

BY JOHN CHISHOLM

It's time for IBM to rediscover its roots. What catapulted IBM to greatness in the mid-1960s was its discovery and implementation in the System/360 of a single, scalable architecture offering binary compatibility across a family of processors. Not only was this IBM's supreme intellectual and business achievement — and it is extremely rare for a single achievement to be both — but it also broadly defined the strategies that all other successful computer suppliers have followed since then.

Last month, IBM celebrated more than 25 years of the System/360 and System/370 by announcing the System/390. The System/390 provides common operating systems and architecture ***within*** the Enterprise System/9000 line, which covers the entire range of the former System/370 (9370, 438x, 3090) and more. But the System/390 does not provide object code (binary) compatibility *across* IBM product lines.

Over the years, System 360 and OS/360 have given way to four major hardware architectures, six major operating systems and countless minor platforms and operating systems for IBM to enhance, support and maintain. With this proliferation, IBM has not only forfeited binary compatibility but has created a beast with a monstrous appetite. Incompatible operating systems and architectures require tremendous duplicate resources for hardware engineering, software development, manufacturing, product testing, customer service and support, sales and administration.

Sustaining these operating systems and architectures will be IBM's downfall in the 1990s unless the problem is quickly addressed. To use its resources most effectively and halt its declining worldwide market share, IBM must rationalize and consolidate its disparate operating systems and architectures.

Limits of SAA

Systems Application Architecture (SAA) was a step in the right direction. SAA provides common applications programming interfaces, as well as user interfaces and connectivity among many IBM systems. But SAA does not eliminate the need for IBM to enhance and maintain MVS, VM/370, OS/2 Extended Edition and OS/400; the non-SAA operating systems VSE/370, System/88 OS, System/88 Unix, System/36 SSP and DPPX; or the three versions of AIX that run on the Personal System/2, RISC System/6000 and System/370. Nor can SAA provide binary compatibility across the System/370 (9370/3090), Application System/400, RS/6000 and PS/2.

Admittedly, the source-code compatibility that SAA provides helps programmers develop common applications for the PS/2, AS/400 or 9370/3090. However, these applications represent a fraction of IBM's total market, given the largely nonoverlapping markets of the three families. SAA is an incremental application-layer solution, and fundamental systems-level surgery is required.

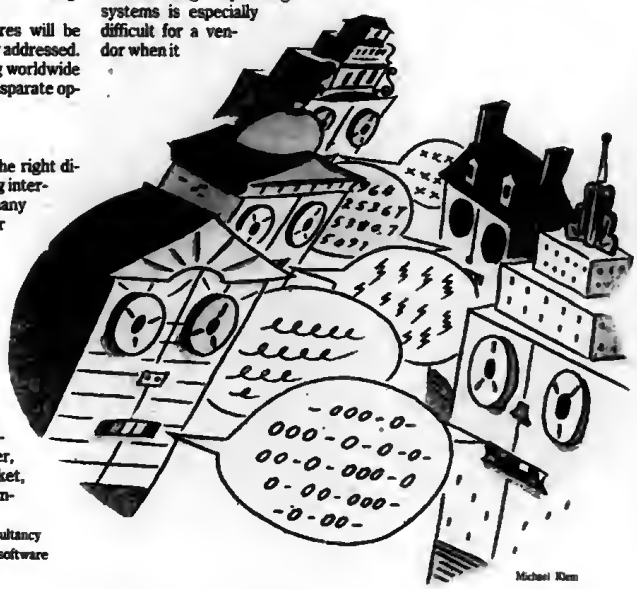
OS evolution

Operating systems, like people, look more similar with age. Given enough time, all operating systems support batch processing, timesharing and networking, offer facilities for backup, recovery and security and provide the availability and throughput needed for high-volume on-line transaction processing. IBM's VM/370, Digital Equipment Corp.'s VMS and Hewlett-Packard Co.'s MPE all currently offer similar functionality. If IBM's operating systems continue to evolve as they have for the last 10 years, by the year 2000 they will also be essentially equivalent — not compatible but with virtually identical feature sets.

That means duplicate effort. IBM, DEC and HP have separately announced that VM, VMS and MPE will be made Posix-compliant. Tactically, these moves are sound: They open the federal systems market, which requires Posix compliance, to these proprietary operating systems.

But as a result, IBM, DEC and HP each have *two* operating systems to adapt to Posix: each company's proprietary operating system and its Unix product. Posix compliance is not very demanding today, but it will become more so over time, increasing the duplicate effort required at each company.

Consolidating operating systems is especially difficult for a vendor when it



Michael Klein

Chisholm is president of John Chisholm Co. in Menlo Park, Calif., a consultancy that specializes in marketing strategy for computer manufacturers and software suppliers.

- **Loss of binary compatibility hurts everyone**
- **From laptops to mainframes, too many voices**
- **RISC System could be standard in 2000**

means moving from a proprietary operating system to Unix. Because customers using proprietary systems have higher barriers to switching vendors than those using Unix, systems with proprietary operating systems and large installed bases typically have higher margins than Unix systems.

For the vendor, the "locally optimal" strategy is to continue investing in the proprietary system. But proprietary customer pools eventually dry up as users develop new applications on open systems with superior price/performance. Usually, the pools dry up rather abruptly, as we saw with Wang Laboratories, Inc.'s VSOS and Data General Corp.'s AOS/VS and now with DEC's VMS.

To avoid local optimization, vendors have to suboptimize — accept lower returns — while operating systems and architectures are consolidated. When a well-executed consolidation is complete, returns will be higher than they would have been had the vendor continued on the locally optimal path. For example, despite HP's recent sluggish financial performance, its results are almost certainly stronger than they would have been if MPE and HP-UX had not been consolidated onto one architecture four years ago.

Goals for architecture

An architecture's purpose is to allow hardware implementations with favorable price/performance, scalability and reliability. Multiple architectures are costly and unnecessary for a vendor to be competitive in both commercial and technical computing, as DEC and Sun Microsystems, Inc. have shown. Multiple architectures increase the costs of hardware and software development, maintenance, support and manufacturing. They preclude economies of scale from common subsystems, memory, peripherals and system-level testing. For customers, they preclude binary compatibility. Customers enjoy binary compatibility within architectures — not across them.

In rediscovering the single hardware architecture, IBM can take a cue from Sun. Sun's Sparc embodies two elements appropriate for the 1990s: First, Sparc is a RISC architecture, with RISC's favorable price/performance, scalability and ease of implementation; second, Sparc is licensed to other vendors, allowing binary compatibility across multiple vendors' systems.

DEC and Apple Computer, Inc. have enjoyed the fruits of essentially single architectures for several years — VAX and Macintosh, respectively — but the market shares of both of these systems are now either flat or declining, in part because they lack these two elements that Sparc embodies.

Strategic planning

To determine how IBM should consolidate its operating systems and architectures, it is first necessary to decide where IBM should be in the long term — say, in the year 2000. It's easy to conclude that AIX (and possibly MVS) are the only current IBM operating systems on which the company should still be doing development in 2000. Demand for Unix will rise gradually, continuously and incessantly over the coming decade and beyond. AIX, if allowed to track Unix industry standards closely, should enjoy the same growth. MVS systems contribute heavily to IBM revenue and profit today and will continue to do so for many years, given the momentum created by their large applications base.

Nonetheless, demand for MVS systems will no doubt reach its peak and begin to decline within this coming decade, probably quite suddenly, just as we have seen for nearly every other proprietary system. Porting a proprietary operating system to RISC will extend the life of a proprietary operating system, as HP has demonstrated by porting MPE to its Precision Architecture. This is an option to be explored for MVS as well.

The RS/6000 is the IBM architecture with the most favorable price/performance, scalability and ease of implementation. Along these dimensions, the AS/400, PS/2 and 370 pale in comparison. Of the architectures IBM currently offers, the RS/6000, encompassing both single and multiple processors, is the one whose descendants are the best choice to underlie IBM's offerings in the coming century.

How to do it?

Now let's get down to the nitty-gritty: How specifically should IBM consolidate its many product lines to either AIX or MVS on RS/6000 platforms? Every system must have a migration path that meets three requirements.

First, the path must be easy to follow, or customers either will not move or will defect to competitors. Second, the path must be attractive, offering incentives such as improved performance, price/performance or functionality. Making the migrations easy and attractive will be costly for IBM, but the cost has a finite life — not quite a one-shot expense, but more like a half-decade expense — unlike the cost of maintaining multiple operating systems and platforms, which goes on indefinitely.

Third, because many customers will not need or choose to migrate right away, existing systems must be enhanced for several years after migration paths are available. This means that IBM should begin offering and refining migration paths to customers sooner rather than later.

A migration path can consolidate architectures, operating systems or both. *Architectures* are consolidated by moving an *operating system* to a new architecture

Continued on page 100

Getting it together: Architectures

Moving operating systems to consolidate architectures *can* be done. Two examples show how operating systems can be moved, even if — like MVS — they were *not* designed to be portable.

Hewlett-Packard — Four years ago, Hewlett-Packard Co. moved Multiprogramming Executive (MPE), which was formerly only available on the 16-bit complex instruction set computing (CISC) HP 3000 platform, to HP's 32-bit Precision Architecture Reduced Instruction Set Computing (PA-RISC) system. This event was a major industry milestone. To this day, MPE is still the only proprietary operating system with any significant installed base (45,000 units) that has been ported to RISC.

Today, the MPE-based HP 3000 and the HP-UX-based HP 9000 use identical PA-RISC platforms except for machine identification chips and I/O cards. HP enjoys tremendous economies between the two families in hardware engineering, manufacturing and software development. HP-UX and MPE are source code-compatible for C, Fortran and Pascal.

Migration of MPE users from CISC to RISC is facilitated by three factors: implementation of a 32-bit version of MPE on PA-RISC, availability of a 16-bit version of MPE through emulation of the 16-bit CISC instruction set on PA-RISC and application source-code compatibility between native and emulation modes.

Together, these three features allow existing CISC MPE applications to run on the RISC platform without recompiling. They also allow applications to be recompiled and run in native mode with few or no modifications when required for higher performance.

CISC and RISC systems also share common network services and may coexist on the same network. The migration and consolidation have been very successful. The original CISC platform for the HP 3000 has now been phased out except for the low-end HP Micro 3000 family. Eventually, even the low end will move to RISC.

Of course, sustaining HP-UX and MPE, both 16- and 32-bit versions, is not as efficient as sustaining only a single Unix variant. Before the year 2000, HP will no doubt offer a migration path from MPE to HP-UX. In the meantime, HP is differentiating the two operating systems by positioning MPE for on-line transaction processing (OLTP). Over the next few years, this distinction will also fall by the wayside as Unix gains the ability to handle OLTP as effectively as any proprietary operating system.

IBM — On a smaller scale, two years ago IBM ported the 8100 Distributed Processing Programming Executive (DPPX) operating system to the 9370. This was beneficial for both 8100 customers and IBM.

Customers now enjoy a growth path with much more performance and many more configuration options; IBM now has to enhance, maintain and manufacture one fewer hardware architecture. Of course, a better target DPPX platform than the IBM 9370 would have been the RS/6000, but in 1986 when this project began, the RS/6000 was not available.

JOHN CHISHOLM

Getting it together: Operating systems

Both IBM and Microsoft Corp. recently have shown that it's possible to consolidate operating systems and live to tell about it.

IBM — IBM developed OS/400 on the Application System/400 to serve as a migration path for both System/36 and System/38 users. OS/400 is a superset of the System/38's operating system, CPF, so the AS/400 is able to run most System/38 application binaries as is. Today, the AS/400 has effectively replaced the System/38.

The path for the System/36 is not as smooth. OS/400 is substantially different from the System/36's operating system, SSP. IBM provides a System/36 emulation mode on the AS/400, allowing System/36 binaries to run without recompiling, but performance is slow. Many users have no choice but to rewrite applications for native mode — a major conversion effort — for better performance.

As a result of the difficult conversion and higher prices of AS/400s, only a small fraction of the 250,000 System/36s worldwide have upgraded to AS/400s. This is expensive for IBM both tactically and strategically: The company risks System/36 customers switching to low-cost, Unix-based multiuser microcomputers and bears the ongoing expense of supporting SSP and manufacturing the System/36.

IBM's response to these concerns is right on target; the company says it will improve the performance of the AS/400s System/36 emulation mode and will introduce lower cost AS/400 models.

Microsoft — Microsoft has announced plans to make Windows Version 3.0 and OS/2 Version 2.0 (or later) binary-compatible — a brilliant move. Microsoft's purpose is *not* to consolidate the two operating systems — Windows and OS/2 will coexist for a long time — but to facilitate market acceptance of OS/2, which has been slow. This represents a perfect example of a company exploiting its existing strengths (the Windows applications base) in order to build a new business (OS/2). In effect, Windows 3.0 becomes an entry-level version of OS/2.

JOHN CHISHOLM

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and phasing out the old one. An *operating system* is "moved" by either porting it as is or reimplementing it to exploit features of the new architecture. Optionally, the new architecture may emulate the old, allowing binaries of the old architecture and operating system to run on the new architecture without recompiling. Operating systems are consolidated by moving *applications* to a new operating system and phasing out the old one. Operating system consolidation requires either recompiling applications, modifying source code and then recompiling, or neither of the above if the architectures are the same.

The type of migration path chosen for each system depends on strategic and technical considerations. Moving an operating system to a new architecture will make migration easier for the customer than forcing him to convert applications to a new operating system. This may be the better approach if the operating system customer base is large, still growing and strategic; or if the operating system customer base is stable and the operating system is stable, requires no further development and porting it is straightforward. However, if applications can be easily converted, that may be the better approach.

A scenario for IBM

All of these methods have been widely used in the industry (see story page 98).

IBM could follow many consolidation strategies for its four architectures and six major operating systems. Detailed technical assessments will influence the final decision. Nonetheless, one hypothetical, aggressive scenario could do the job (see story page 101).

At a minimum, a strategy must cut through the tactical jockeying among product groups, such as "protecting" the AS/400 from the RS/6000 or vice versa. This scenario shows only the migration of operating systems and platforms, not the broadening of the RISC family to include superminí- and mainframe-class systems, which presumably would take place concurrently.

Imagine the power of IBM building, supporting and selling a single binary-compatible line, from laptops to mainframes, based on successors to AIX and the RS/6000. The company would be a juggernaut that would make both Thomas J. Watsons proud. However, if it is not done very soon, consolidation will be useless. Who would suggest porting Wang's VSOS or Data General's AOS/VS to RISC today?

A final vision

By the year 2000, an industry-wide shakeout will be well under way on binary compatibility. There will probably be room for no more than three or four binary standards. One will no doubt be successors to the Intel Corp. 80X86 chip family. Another will probably be successors to Sparc, which is off to a strong start in executing its multivendor compatibility strategy. A third candidate is Mips Computer Systems, Inc., if Mips can get its many licensees (i.e., Pyramid, DEC, Silicon Graphics) to agree on a single binary-compatible standard. A fourth candidate is IBM's RISC System.

Beyond consolidating its own product lines onto the RISC System, IBM can do two things to help establish the RISC System as a standard. First, IBM should offer the RISC System architecture for licensing, as HP has licensed its Precision Architecture to Hitachi and Samsung, so that binary-compatible RISC Systems are possible from multiple vendors.

Second, IBM should make AIX compatible with AT&T's Unix System V, Release 4 and OSF/1. System V, Release 4 already has too much momentum for any vendor who aspires to be a Unix leader to ignore.

IBM may feel that these two moves are unnecessary and that its backing alone should be sufficient to ensure widespread market acceptance of RISC. That would be risky thinking and pointless: In this, the open systems decade, no single vendor need go it alone. RISC has the potential to provide an *industry-wide* binary standard. There will be no other kind in the year 2000. •

A modest proposal

Nine steps to a streamlined IBM

There are many ways for IBM to consolidate its four architectures and six major operating systems. This scenario shows only the migration of operating systems and platforms, not the broadening of the RISC system family to include supermini and mainframe systems, which would presumably take place concurrently.

Step 1 — *Offer OS/2 on the RISC System/6000 as well as on the Personal System/2.* Consolidating PS/2 and RS/6000 is not an objective: Intel Corp. microprocessor-based PS/2s will long survive to run MS-DOS. But Microsoft Corp. has announced plans to move OS/2 to RISC platforms, so OS/2 on RS/6000s seems likely early on (although the first platform may well be the Intel 1860 rather than the RS/6000). **1992**

Step 2 — *Move OS/400 to RS/6000; phase out System/36 platforms.* OS/400 includes some unique features, such as its built-in relational database. It will be hard to migrate these applications to a new operating system, so we have moved OS/400 intact to the RS/6000 as an interim step. Software emulation of the Application System/400 will be required to facilitate migration. This would allow RS/6000 systems to replace System/36s, System/38s and AS/400s. **1992**

Step 3 — *Migrate VSE applications to AIX; phase out VSE.* **1993**

Step 4 — *Make AIX binary-compatible with OS/2 on the RS/6000.* **1994**

Step 5 — *Migrate VM applications to AIX; phase out VSE.* **1994**

Step 6 — *Migrate OS/400 applications to AIX; phase out VM.* The applications of three IBM operating systems are migrated to AIX, with those of the least strategic operating system, VSE, migrating first. Systems Application Architecture-AIX commonality will facilitate migration of VM and OS/400 applications to AIX.

Making AIX binary-compatible with OS/2 would bring the then large base of OS/2 and X Window System productivity applications (e.g., spreadsheets, word processing, graphics) to AIX on the RS/6000. **1995**

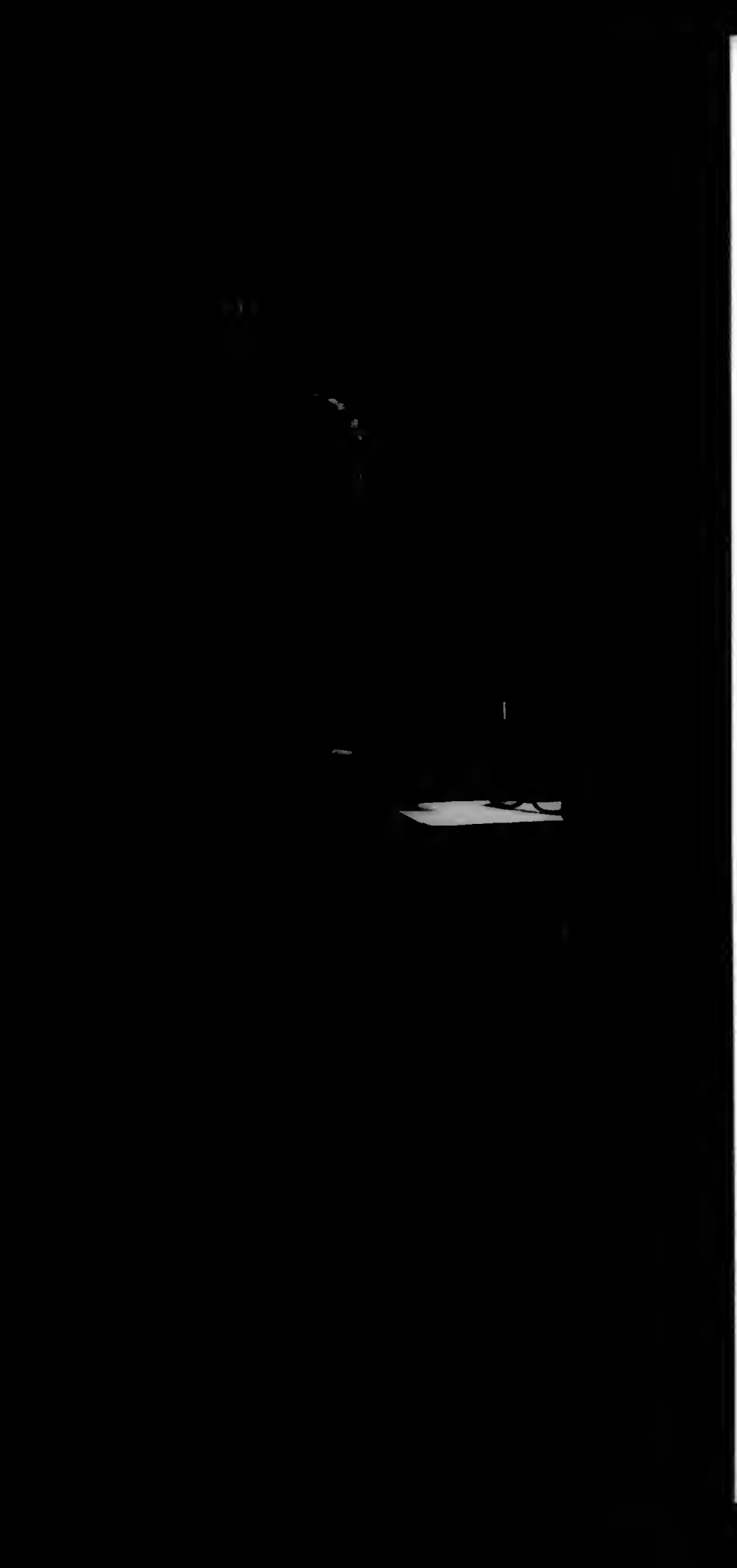
Step 7 — *Move MVS to RS/6000; offer choice of System/370 or RS/6000 platforms for MVS.* The guts of this or any other scenario is moving MVS to the RS/6000 architecture — a Herculean investment and effort. Any of the several possible approaches would depend on recent and forthcoming advances in computer-aided software engineering and design automation to be practicable.

First, the architecture could be pure RS/6000, a superset of RS/6000 or a custom architecture using RISC techniques. Second, MVS could be ported as is or reimplemented to exploit the RS/6000 architecture. Reimplementing, an even larger job than porting, has the potential to bring advanced new functionality to MVS. Third, System/370 emulation mode could be done purely in software or with the aid of hardware assists. **1996**

Step 8 — *Phase out System/370 architecture platforms.* **2000**

Step 9 — *Migrate MVS applications to AIX; phase out new sales of MVS.* Eventually, follow-ons to RS/6000 systems will surpass follow-ons to System/370s in every aspect: millions of instructions per second, I/O throughput, price/performance, expandability, reliability and availability. As this happens, demand for MVS will naturally shift away from System/370s to RS/6000 systems. And finally, to avoid having to duplicate development between MVS and AIX, IBM will offer an MVS migration path to AIX. **2005**

JOHN CHISHOLM



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NATIONAL
BRIEFS

Defense

Zenith Data Systems gained an unexpected ally recently in its defense against patent infringement charges brought by **Texas Instruments, Inc.**: California inventor Gilbert Hyatt, who was awarded a patent on the micropressor said to have spurred the rise of the microcomputer. Hyatt's patent attorney said his client will show the court that his own work predates the patents that TI said Zenith infringed on.

■

Default

Tinton Falls, N.J.-based real-time computer maker **Concurrent Computer Corp.** announced last week that it was unable to meet the September interest and principal payments on its senior bank debt. According to recently appointed Chief Executive Officer Denis Brown, the company, bank and shareholders agree that corporate and capital changes are called for. The question that remains to be answered is whether the firm's financiers will agree to give Concurrent the breathing space to finish drafting and begin implementing a new business plan.

More briefs on page 107

Sequoia rebounds with a vengeance

CEO Fusco has brought vendor back from death's door with 56% rise in revenue

BY MARYFRAN JOHNSON
CW STAFF

In an industry where one failure can be fatal, Marlboro, Mass.-based Sequoia Systems, Inc. has returned from the grave's edge with something akin to a healthy glow.

Strutting out revenue for fiscal 1990 that soared 56% over the previous year's to $48.6 million, the Unix-based fault-tolerant computer vendor has fortified itself this past year with big-name business alliances with Hewlett-Packard Co., Samsung Electronics Co. Ltd. and Raytheon Corp.

"The only thing we have to fear is shooting ourselves in the foot," said Gabriel Fusco, the beefy, gravelly-voiced chairman and chief executive officer who pulled Sequoia back from the brink three years ago.

Sequoia has doubled its manufacturing capacity, raised $20 million in cash, moved to new headquarters to accommodate a work force of some 250 employees and successfully ushered out its Series 300 systems — six weeks ahead of schedule.

Fortune 500 league?

A slew of new software announcements, which the firm is poised to make within a few months, will ratchet up its potential to win Fortune 500 accounts, company officials claimed.

"Clearly, Sequoia went from living to zombie to living again, and very few companies have done that," said Peter Kastner, an analyst at Aberdeen Group in Boston. "But Sequoia is leaping for the brass ring from on top of a house of cards."

Kastner was referring to the fact that much of Sequoia's recent success is tied to OEM relationships with 10% stakeholder HP, which has exclusive rights to sell Sequoia boxes in the telecommunications marketplace, and The Ultimate Corp., which has a lock on selling Sequoia systems in the Pick commercial marketplace. Yet another OEM relationship with Samsung gives that company exclusive rights to sell Sequoia systems in South Korea.

Scott Bounsick

Sequoia's Fusco *hung on to the faltering firm, dragged it back into the fray*

Fusco argued that these business partnerships give Sequoia the kind of international reach and marketing cachet it could never attain on its own.

The alliance with HP gave Sequoia access to HP's highly regarded reduced instruction set computing technology and brought in a much needed capital infusion of $5.8 million — HP's purchase price for 10% of the company. Part of the deal also required HP to buy 22 systems for resale under its own label; HP has more than doubled that commitment already, Fusco said.

"I would characterize our relationship [with HP] as a marriage, whereas OEM relationships are only affairs," he said. "What we have is an eight-year partnership with a lot of room for innovation."

The OEM relationship with Samsung is also enhanced by the two companies' plan to build the Series 40, a kind of little-brother machine to Sequoia's main line.

"If they're able to pull off a coup with Samsung and produce a system that retails for under $100,000 and supports 100 or more users, it could be a significant challenge to a lot of other vendors in the industry," observed Robert Kidd, an analyst at Dataquest, Inc. in San Jose, Calif.

"Sequoia's lifeline today is attached to other vendors, although looking at

Continued on page 110

Software developers climb onto assessment bandwagon

BY GARY H. ANTHES
C/W STAFF

PITTSBURGH — The Software Engineering Institute (SEI) at Carnegie Mellon University is about to certify nine companies to administer its software development assessment method. Officials at SEI and the companies said the assessments are increasingly in demand and are viewed by the companies as a competitive advantage, particularly when bidding on federal government jobs.

The companies to be licensed are American Management Systems, Inc., Arthur D. Little, Inc., Booz, Allen & Hamilton, Inc., Contel Corp., Dayton Aerospace Associates, Inc., Digital Equipment Corp., Pragma Systems Corp. and Technology Applications, Inc. Also on the list is the Software Productivity Consortium (SPC), an organization to which a blue-ribbon list of technology firms contributes talent. Teams at the firms will be trained to conduct formal assesaments of the software practices of client companies and will be licensed to issue ratings according to a process-maturity scale developed by the SEI.

While it has conducted some assessments itself, the SEI lacks the staff to handle the burgeoning requests now coming in at the rate of two to three per week, said Betty Deimel, a staff member of SEI's Technology Transition Program. Teams from the nine companies will be ready to offer assessment services by the end of the year, she said.

The SEI is funded by the U.S. Department of Defense (DOD). The assessment program was established as a way to transfer software engineering technology developed under DOD sponsorship to the U.S. defense industry. However, Deimel and others said the increasing complexity of systems and the skyrocketing cost of software development are spurring interest in assessment methodologies among nondefense companies as well.

The SEI method is centered around a five-day site visit during which vendor/client teams assess the software practices of the client through a series of structured discussions. At the conclusion of the assessment, an overall process-maturity rating is assigned, and recommendations for improvements are detailed (see story below). Depending on contractual agreements, the licensed vendor may or may not assist in implementing the improvements, Deimel said.

The intent is to assess the organiza-

Rating maturity

The SEI's Software Process Assessment method assigns one of five maturity levels to software developers:

- **Level 1** — Initial process. The process is ad hoc, sometimes chaotic. There is no management mechanism to ensure that formalized procedures and project plans are used. In a crisis, controls are abandoned and people just work harder at coding and testing. There is little senior management involvement.
- **Level 2** — Repeatable process. Through experience, the organization has mastered projects of particular types but stumbles on new challenges. New technologies may do more harm than good by upsetting the base of experience on which past successes have been built. Growth is slow and painful, and organizational changes can be highly disruptive.
- **Level 3** — Defined process. The organization has established a group to focus exclusively on improving the software development process. An array of development tools and methods is in place, but there is no way to quantitatively measure the effectiveness of each step in the development process.
- **Level 4** — Managed process. Methods are in place to measure the cost and quality, or benefit, of each activity. For example, what is the cost and benefit of error detection and correction? The data is costly to gather and maintain.
- **Level 5** — Automated gathering of process-measurement data. The data is used to prevent problems and improve efficiency.

Of 113 project assessments conducted or observed by the SEI so far, 85% fell into level 1, 14% were at level 2, 1% were at level 3, and none were at levels 4 or 5.

GARY ANTHES

tion's practices as a whole, not to critique particular projects, Deimel said. However, she added, several projects are normally examined during the assessment.

Greg Friedman, a spokesman at Herndon, Va.-based SPC, which is sponsored by 14 aerospace and defense firms, said the SPC will have four trained teams, each expected to be employed full-time doing assessments. He said a typical engagement should cost the client less than $75,000.

According to Friedman, some SPC member companies have asked for assessments themselves, and all hope to benefit from the program by learning more about software engineering practices in the industry.

Federal agencies are encouraging bidders to go through some kind of standardized assessment, Friedman said, and some agencies have conducted vendor assessments themselves as part of the proposal-evaluation process.

Friedman added that some agencies may also favor companies having a high rating, although the emphasis should be placed on the firm's ongoing program to improve its software engineering practices.

Publicizing results

Results of the assessments remain confidential, but Deimel acknowledged that some companies seeking a competitive advantage may publish the results.

"I'd say that if you have level 3 practices in place, you'd want to publicize that," Deimel said. However, of the 113 project assessments conducted or observed by SEI so far, 99% of them fell into level 1 or level 2, she said (see story page 106).

"We see a market to design, tailor, install and support software processes for clients," said Judah Mogilensky, director of technology marketing at Contel. "A software process assessment ... would be a first step in identifying a client's process needs."

Ron Willis, chief scientist for software engineering technology at Hughes Aircraft Co., said Hughes was so happy with the results of its 1987 SEI-assisted assessment that it went through a reassessment this year. In the first round, it was noted that Hughes collected process data on a project-by-project basis but did not have a way to integrate the data from multiple projects. The company earned a "strong level 2," Willis said.

By the time the reassessment occurred, Hughes had put in place an automated system for capturing and maintaining the process data, allowing cross-project performance comparisons and statistical analyses for the organization as a whole. A "high level 3" was earned this time in a process that Willis said cost Hughes $45,000 in internal labor and other expenses.

"I'm really sold on it because it's mobilizing the U.S. to improve," Willis said. "The process-maturity concept and the pressure by [DOD] to use process maturity are mobilizing us."

NATIONAL BRIEFS

Where's Bob?

Somebody check the betting pool. Almost three months to the day since announcing that he was leaving **3Com Corp.**, the company he founded, Bob Metcalfe is back in the biz. A recurring question in networking circles since he left has been when the agitator/inventor would re-enter computing. Last week, **IBM** said that Metcalfe would advise it on its quest to build standards-based advanced applications system software.

■

Index down

Tighter margins and lower expectations dogged an upper-CASE market player last week as Cambridge, Mass.-based **Index Technology Corp.** said it expects to report an approximately $500,000 loss for the quarter ended Sept. 30. Index Chief Executive Officer Richard Carpenter laid the impending loss at the door of the high cost of aggressive product development: Two new products recently came out the door, and two more products are coming soon. Revenue for the company, he said, should be up about 15% over revenue reported for last year's fall quarter.

■

Full Cleveland

High-tech public relations firm **Winston and Winston** may have traded in its Texas home base, but it still knows how to take the bull by the horns. Native Buckeye Staters Martin and Judith Winston have pledged a year's worth of self-funding to a campaign to persuade technology companies to follow their example and relocate to Cleveland. The Winstons insisted that their move was impelled by business logistics, not nostalgia; Cleveland's kit of advantages for tech firms, they said, includes a wealth of available commercial support services and tax authorities who share their zeal for luring companies to the region.

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Sequoia

CONTINUED FROM PAGE 105

any small company today, that's hardly a unique situation," added John Dunkle, an analyst at Workgroup Technologies in Hampton, N.H. "What Sequoia is doing is using those current agreements to leverage additional sales, then taking those earnings and reinvesting in the business to develop their own products."

Analysts tend to give the lion's share of Sequoia's comeback credit to Fusco. The 26-year IBM veteran spent four years managing Iomega Corp., which makes data storage devices, before joining the fault-tolerant computer vendor in 1987.

As a start-up in 1981, Sequoia staked a claim in what was then a backwater niche of Unix-based fault-tolerant systems. Its first beta-test shipment was in 1984, but software problems bogged down commercial shipments for three years.

When Fusco arrived at the moribund Sequoia, the company was out of cash, unable to get its Series 200 systems out the door and paring its work force down to a historic low of 53 employees.

"A lot of small companies talk about [doing] what he managed to do," Kidd said. "And that's getting decent financing and lining up people to give them clout and distribution channels and a hell of a lot of credibility."

Fusco volleys that credit right back to his own management team and employees. "I benefitted from all those years of effort and an awful lot of money spent on designing our basic architecture," he insisted. "I got to build the company rather than shrink it."

New contestants

These days, Sequoia's niche is a bustling place with new Unix competition from Tandem Computers, Inc. and Stratus Computer, Inc., the two biggest names in fault-tolerant computers. "The big vendors are going after OLTP, and general competition is high," Kidd noted. "Does any small company, fault-tolerant or not, have the staying power to hold out? That's the real question."

Despite showy growth over the past year, Wall Street continues to cast a cold eye on Sequoia. Its stock price recently hit 6⅛ points, the lowest price since the company went public last March.

Still, there are signs of a thaw. Thomas Rooney, an industry analyst at Donaldson, Lufkin and Jenrette, initiated coverage of Sequoia last July with the observation that its stock was undervalued. Rooney noted how growth in Sequoia's target on-line transaction processing (OLTP) markets — financial services, telecommunications, manufacturing/distribution and federal government contracts — is anticipated to run "in excess of 40% over the next three years."

Sequoia is also keeping one foot in the still lucrative defense market. Raytheon Corp. is using Sequoia's multiprocessor and fault-tolerant technology to develop space-borne applications. The revenue potential there, Fusco said, will come in royalties and cross-licensing agreements.

"We've been through the time when we had to convince people it was worth the risk to buy us," he said. "We can't forget what we've been and where we want to go."

That is the kind of attitude some analysts believe may leave Sequoia standing among the survivors on the OLTP battlefield of the 1990s.

"I would bet that Sequoia will be successful because they know who they are," Dunkle said. "They're reinvesting in their own technology, and they haven't burned any of their past customers. That shows their dedication to the market long term."

Back on the competitive cutting edge

Sequoia builds multiprocessor, crash-proof computers running either its own version of the Unix operating system or Pick, an industry-standard operating system with thousands of commercial applications and 2.5 million devotees.

Sequoia machines range in price from $480,000 to $3 million and are optimized for high-performance on-line transaction processing.

However, since its prices run 25% to 30% higher than those of competing Unix vendors, Sequoia faces tough price/performance competition from parallel computing vendors such as Sequent Computer Systems, Inc. and Pyramid Technology Corp.

The average Sequoia sale runs about $750,000, and the machine is often used in environments with enormous databases, sprawling terminal networks and high transaction volumes.

Contractors Grumman Corp. and Raytheon Corp. bought Sequoia systems to relay missile tracking information and interpret surveillance data. GTE Hawaiian Telephone uses a Sequoia system for network management and support, and Bell Atlantic Co. uses one to deliver call-forwarding services.

MARYFRAN JOHNSON

COMMENTARY

Jim Nash

Earthquakes, user stakes

In relation to the number of square miles affected by an earthquake, the epicenter is very small — just two opposing pieces of rock grating together till one gives way.

So it is in the business world and, in particular, the world of LANs. There, the long-silent rift between Microsoft and Novell is widening, causing rumblings that could, and maybe should, prove disconcerting to users waiting to enjoy Novell/Microsoft intermanageability.

At the center of the tension is a single and relatively minor point of contention. It appears that a contract dispute worth $500,000 is all that keeps the two networking firms from cooperating with each other long enough to make their operating systems intermanageable. Intermanageability would greatly simplify the task of running multivendor networks.

Of course, more than petty accounting points are aggravating the situation, but Novell CEO Ray Noorda said he could work closely with Microsoft if only the dispute were settled. Microsoft refused to comment on the matter at all.

At issue is money that Provo, Utah-based Novell claims is owed it by Microsoft for work done by Novell's most recent acquisition, Excelan.

Back in 1988, Excelan — not yet within the Novell fold — was writing TCP/IP for Microsoft's LAN Manager network operating system. As part of that contract, Excelan had to license certain Microsoft code rights. According to Excelan's former president, Kanwal Rekhi, Excelan had paid $500,000 — of a total of $2 million — to Microsoft for royalties and code rights by the time the Novell acquisition made the Microsoft/Excelan project moot.

Rekhi, who is now executive vice-president of product development at Novell, said that Microsoft was enraged after hear that Novell was going to merge with Excelan in 1989. He said that despite a trek he and Noorda made to Microsoft's corporate headquarters in Redmond, Wash., to unruffle feathers, Microsoft took back its equipment and code before the merger was signed.

"Now they refuse to refund our money," Rekhi said. "When we went up there, we were ready to provide interoperability between Netware and LAN Manager and help market the solution, but they were adamant about not helping us at all."

I'm not talking deprivation on either side of the spat, however. Novell's net revenue reached $422 million last fiscal year. And reports are that Microsoft CEO Bill Gates recently bought a Porsche worth an estimated $600,000.

Is anyone, in fact, doing without? Yes — the users, for whom interoperability is still in the promise stage.

These firms have it in their power to resolve their differences quickly and get on with their efforts to move the networking industry forward through interoperation. The earthquake released by allowing up to 85% of the market to manage their systems without a hitch would be far-reaching, all right. It's hard to believe, however, that it would be seen as a disaster by the hordes of IS managers suddenly riding herd over a less redundant, less chaotic environment.

Nash is a *Computerworld* West Coast bureau correspondent.

INTERNATIONAL

BRIEFS

China beachhead

Hewlett-Packard Co. and China's **Ministry of Machinery and Electronics Industry** have teamed up in what is said to be the first China-based joint venture aimed at manufacturing workstations. Called **Huapu Information Technology Co.**, the Shanghai-based co-venture company — HP's second on Chinese soil — will assemble and deliver to the Chinese domestic market the latest in HP workstations: the HP Apollo 9000 series.

■

Picking up the pace

Japan-based **Kubota Corp.**'s Santa Clara, Calif.-based subsidiary, **Kubota Pacific Computer, Inc.** (KPC), went into full gear late last month, manufacturing graphics supercomputer products for Kubota partner **Stardent Computer, Inc.** The new 55,000-sq-ft plant has picked up some 90 former Stardent employees and development of several product lines whose continuation was otherwise questionable because of Stardent's summer decision to centralize its formerly bicoastal headquarters in Newton, Mass. Not only is KPC up and running, it is also hiring: The firm said that it expects to add 50 to 100 engineers and manufacturing personnel by year's end.

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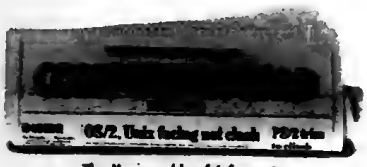

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Lowdown on making consultant grade

BY JANET RUHL
SPECIAL TO CW

It's not easy for an outsider to walk into a company, build instant trust and tell managers why they're doing something wrong and how they can fix it. There's no denying it, though: Consultants provide an evaluative eye that in-house staff simply can't match. But just what does it take to make it as a consultant these days?

A group of consultants who have practiced for at least 10 years offer some answers. Most of them, who now handle everything from management consulting to writing and supporting vertical applications packages, began their consulting careers as contract programmers. Their first contracts were usually with companies at which they'd previously worked as employees. Innocent and convenient as it sounds, this is the first consulting pitfall. Often, the consultants agreed, they relied too heavily on their first client.

Jeffrey Sachs, president of Alembic Computer Services, Inc. in Mesa, Ariz., indicates that it was scary to be dependent on one customer when he first began to consult. "After the first year, I promised myself I would never, ever find myself with all my eggs in one basket," Sachs says. Sachs, who has been consulting for 11 years, has kept his resolution: His firm supports 75 active accounts.

Few of the consultants still work in the same hardware and software environments they mastered as employees, but several of them continue to concentrate on application areas that they had learned on the job. Bob Upham, president of Kendall Holt, Inc. in New York, supports this idea. While the technical skills he brought with him were important in getting started, he now relies extensively on the skills in business analysis, project management, project life-cycle methodology and personnel management that he learned as an employee prior to consulting.

Like most of the consultants interviewed, Upham says that his biggest surprise about consulting is "the amount of work involved in maintaining the business." Successful consulting, he says, requires a lot of interaction with accountants, lawyers and bankers, as well as constant networking with other business people.

As their businesses have grown, many consultants have moved from selling their own services to managing the work of employees. After 13 years, Sachs says, he began to burn out on technical work. As a solution, he says, he "started hiring kids who were thrilled with the challenge of writing a program." This allowed him to concentrate on analysis and design, dealing with clients and monitoring the financial state of his firm.

Satis-factors

The consultants who seem to be the most satisfied with their careers are those who have either followed a pattern similar to what Sachs describes or devoted some of their energies to developing and marketing software as well as services.

Y. Alan Griver, a partner in Flash Creative Management, Inc. in Teaneck, N.J., says that while he loves the consulting side of his business, he realized that "having a somewhat static part of the business bringing in cash can help ease the pressure on the consulting side." Griver says that the money software products bring in makes it possible for him to pick and choose the interesting consulting jobs.

For those who have not diversified their consulting practices, burnout becomes a very real threat. Eric Poole, who for the last 12 years has run RKT Technologies, Inc. in Windham, N.H., observes that "there aren't many people who make it past a decade."

A major source of frustration for a consultant is the need to keep up with ever-changing technologies. Stephen Kent, a partner at Mid-Michigan Computer Consultants, Inc. in Bay City, Mich., sums up the prevalent attitude: "I hate having to learn something new every week, but I do it anyway." Over the course of his 11 years as a consultant, Kent has at different times concentrated on Honeywell, Inc. systems and developing software for Datapoint Corp. systems. Now, as an IBM business partner, he works mainly on IBM midrange systems and personal computer software.

Even those who have been successful building consulting careers around specialized niches must keep an eye on emerging and competing technologies. Austin, Texas-based database consultant Jim Hoffman, who has worked with SAS Institute, Inc.'s System 2000 databases for the past 12 years, has taken care to cross-train on two other database products: Computer Corporation of America's Model 204 and Oracle Systems Corp.'s Oracle.

Consultants must remain flexible and show a willingness to play many roles in response to changing client needs. Jeff Jacobs, president of Consart Systems, Inc. in Manhattan Beach, Calif., and an independent consultant for 17 years, reports that within a short period of time, he found himself doing hands-on programming in LISP as well as planning enterprisewide deployment of systems for a major oil company.

Marketing value

All of the consultants agree that the need to market themselves to clients never goes away. John Thompson, president of Logic Consultants, Inc. in St. Louis, who has been consulting for 20 years and whose company employs 24 people, sums it up. Although he admits that "marketing is not one of my favorite things," he pursues a marketing strategy that relies on a combination of limited advertising, referrals from previous clients and contacts made through his active participation in professional organizations.

According to Hoffman, building a relationship with a vendor can be an effective way to find clients. Guy Scharf, president of Software Architects, Inc. in Mountain View, Calif., says that the nature of the consulting business is often "feast or famine." Consultants may have more customers than they can support one month yet find themselves idle the next.

When the consultants were asked what the incentive was in working 70 to 80 hours per week, Sachs summed it up best: "Independence can be addictive."

Ruhl is a consultant and programmer in Connecticut and author of *The Programmer's Survival Guide: Career Strategies for Computer Professionals.*

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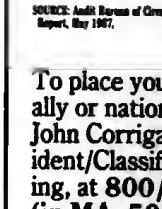

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Senior System Programmer/Analyst to support the system specifications, database design and application for Federal Government Integrated Image System utilizing formalized system design structured methodologies, software engineering techniques (included life cycle/specification/test/documentation analysis), Relational DataBase model, 4GL (fourth generation language), SQL (structured query language), COBOL and "C" language. Perform all functions and duties of Image System implementation and maintenance under the WANG VS-7310, VS-65 and VS-5000 operating system. Salary: $38,750.00 per year/40 hour week. Requirements: Bachelor of Science Degree in Computer Science plus two years experience as a system programmer/analyst. Applicant's working experience must include evidence of Relational Database Management Systems design/development with Informix db Vista, db Query, 4GL, SQL and C as Unix, OSM 4300 mainframe, UNIX Sperry 5000 and MS-DOS architecture knowledge required. Applications to: Mrs. Jimmie Gaston, ALC Specialist, Job Service, 505 Washington, St. Louis, Missouri 63101. Refer to Job Order #407875.

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SOURCE: Skill Survey of Computerworld's Audience, May 1989.

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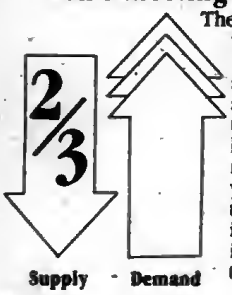
A few important tips on recruiting computer professionals

Finding computer talent isn't as easy as it used to be. In fact, there was a time when you'd just run an ad in the local newspaper and you could make a hire without waiting too long or spending too much.

But times have changed. And like so many facets of today's business, so has the effectiveness of traditional recruiting methods.

What's more, many of today's recruiters *don't use* today's most efficient methods — methods that save time and money for some widely unknown reasons.

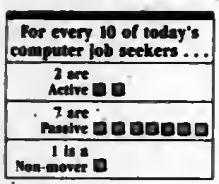
The supply of qualified professionals isn't meeting demand



The American Council on Education reports that the number of college students choosing computer careers is down two-thirds since 1982. To make matters worse, there are more computers in today's business that require the skills of this shrinking market than ever before. And while you may never consider the company next door your competitor, it likely *is* competing for the same computer talent today. The result is a classic supply/demand problem that isn't changing for the better -and that's sure to make your recruiting tougher in the '90s.

Ads in local papers don't reach your major hiring market anymore

That's because they generally reach "active" job seekers — those who actively seek out the local newspaper to find jobs — and who a recent *Computerworld* job satisfaction survey found to represent 2 in 10 of today's computer professionals. The study also found that 7 in 10 of today's computer professionals are "passive" job seekers — those who would *consider* new job options, but likely never look for them in the local newspaper. (The remaining small percentage are "non-movers" content with long-term jobs.)



In short, this means that your ad in today's local newspaper reaches no more than 20 percent of today's computer job seekers. What's worse, if you're not using other vehicles that reach far more job seekers, your local newspaper expenses are as inefficient as their limited audience.

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Please call or write Edward Millis Director of MIS

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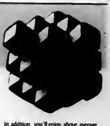

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MARKETPLACE

Neural networks can't think, but they can learn — almost

BY JESSICA KEYES
SPECIAL TO CW

While no technology can exactly simulate the process of human thinking, neural networks are putting on a good show. They can make sense of patterns in handwriting and speech and can even "learn" from their mistakes. They can be "taught" rather than programmed and can handle jobs that conventional software usually can't.

A neural network is a program or algorithm that learns through repetition. Neural networks are not programmed. They simulate a network of hundreds of parallel-processing interconnected units shooting messages to one another at a rapid-fire pace. A neural network receives input and then responds, which can give the impression that it is actually thinking and solving a problem.

While neural networks are not replacing conventional software, they're beginning to absorb tough jobs not handled well by other tools. Some examples of tasks that neurals networks are performing:

• A neural network handwriting recognition package has been developed at Texas-based Bank-Tec, a financial service institution that develops and sells check processing systems for banks. The Bank-Tek neural network can reportedly save banks hundreds of thousands of dollars each year by reading and approving the handwritten numerals that appear on the face of each check.

• American Express Co. is using neural networks to evaluate credit risks. This application, called credit scoring, is popular with financial institutions because it can assess a credit application's worthiness based on previous examples entered into the neural network.

• The Chase Manhattan Bank NA in New York is fighting credit-card fraud by using a neural network to sift through hundreds of thousands of credit-card transactions each day and flag possibly fraudulent transactions.

• John W. Loofbourrow Associates, Inc. in New York used a $995 neural network package runing on an IBM Personal Computer to develop a system that forecasts Standard & Poor's Corp.'s 500 index.

Before you jump into a major neural network purchase, however, there are several points you should keep in mind:

Know what you're getting into. Neural networks are highly complex. Before you embark on a large-scale project, a little research and development is warranted. Neural networks don't work like conventional technology; they don't even work like expert systems, their closest artificial intelligence cousin. Educate your staff so they can fully understand the workings of neural networks. Probably the best way to do this is to buy an inexpensive package to use as an entry-level training and exploratory tool.

Software vs. hardware. Neural networks can be purchased either as hardware or software with a variation in price that spans from as little as $100 to as much as $75,000. While the first commercially available neural networks were add-in boards, software packages are much more popular with commercial users because they're less expensive and can be used on PCs. If you need more processing power than your PC can supply, a high-power plug-in board can be purchased.

Hardware neural networks are mainly used in research and science institutes. Special analog circuits can speed processing time, allowing the network to handle large, complex projects.

If you choose to go the software route, make sure that the package you choose hooks into your standard database files. If your database is an Ashton-Tate Corp. Dbase file, make sure that your neural network software can access Dbase. If it can't, make sure it can at least access a standard ASCII or Unix file.

Implementing a neural network can be frustrating. Neural networks need loads of data entered at the beginning, so allow time for that. Also, make sure that you choose a task in which the data can be obtained from a source that's already automated.

Auditing is not an automatic feature. One major drawback to using this technology is that there is no way to trace how a neural network arrives at its conclusions. There are many applications that require an audit trail for legal and other regulatory considerations. However, help may soon be on the way. One company has announced the availability of such a function, derived from the patents of a Northeastern University professor. This function forces the network to develop a set of "If . . . then" rules that can be used for auditing purposes. When selecting a neural network, ask the vendor if this function is available.

Training, support and documentation. While several of the neural network vendors offer excellent training, many don't offer any at all. In those cases, the information systems manager might have to buy training services from a training vendor or consultant. Levels of support vary according to the amount spent on the software. The minimum that should be accepted, regardless of the price paid for the software, is telephone support.

Keyes is president of New Art, Inc., a management and computer consulting firm in New York.

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The BoCoEx index on used computers

Closing prices report for the week ending September 21, 1990

	Closing price	Recent high	Recent low
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XT Model 086	$500	$700	$350
XT Model 089	$450	$725	$400
AT Model 099	$900	$1,075	$850
AT Model 239	$975	$1,025	$700
AT Model 339	$1,025	$1,300	$900
PS/2 Model 30-286	$1,250	$1,300	$1,125
PS/2 Model 60	$1,500	$1,800	$1,400
PS/2 Model 70P	$3,375	$3,400	$3,175
Compaq Portable II	$975	$1,050	$875
Portable 286	$1,275	$1,450	$1,100
SLT-286	$2,500	$2,825	$1,700
Portable 386	$2,700	$3,000	$2,500
LTE 286	$2,100	$2,200	$2,000
Deskpro 286	$1,375	$1,400	$1,200
Deskpro 386/20	$2,900	$3,100	$2,400
Apple Macintosh 512	$375	$775	$275
512E	$450	$450	$350
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Request for Proposal No. 1876, due Friday, October 26, 1990 at 3:30 p.m. for the acquisition of 10 CAD workstations and 5 dot matrix printers for the Drafting and Design Department of HOLMES COMMUNITY COLLEGE.

Request for Proposal No. 1874, due Friday, October 26, 1990 at 3:30 p.m. for the acquisition of CAD workstations, a plotter, and a printer for the Drafting and Design Department of PEARL RIVER COMMUNITY COLLEGE.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Patsy Stanley @ (601) 359-3864

REQUEST FOR PROPOSAL
City of Corvallis, Oregon

City of Corvallis seeks proposals for assistance in its planning, solicitation, evaluation and implementation of replacement financial accounting and management mainframe software. The City uses an IBM 5382, Model 300.

Interested firms should contact Finance Director Mark Larson at (503) 757-6860 or FAX 757-6836 for a complete proposal request.

All responses to this proposal are due to the City by October 12, 1990.

Take Networking 101

Managers should make sure their employees are well connected

BY SUE REDKEY
SPECIAL TO CW

How can an information systems manager continue to develop people who already have all the technical skills they need to do their jobs? One good way is to suggest courses in consulting, leadership skills and public speaking. You could go another route, however, and encourage a different kind of education — networking.

Networking is a critical weapon that seasoned professionals should be able to brandish artfully. Unfortunately, it's something that few of us do well instinctively. There just aren't any formal training classes on how to develop long-lasting, productive contacts with colleagues. Fortunately, an IS manager can be a big help in teaching his staff some basic networking techniques and demonstrating the long-term benefits.

Networking is not directing, delegating or reporting; it is sharing, teaching and helping. Contact-grooming will extend your staff members' professional identities beyond the boundaries of their company and their own experience. And it certainly can't hurt them to have these contacts when the time comes for them to circulate their resumes.

From a manager's point of view, networking serves as a sort of postgraduate professional seminar. When people on your staff get to the point where they have taken all the formal training required to do their jobs well, they still need the stimulation of new ideas. They need the opportunity to share their knowledge and experience with others. By learning how to network, they get a form of "training." Your staff will appreciate the ability to move beyond their immediate job responsibilities and distinguish themselves as professionals in their field.

Leading the way

When was the last time you suggested to anyone in your department that he ask the advice of a colleague from another department? Another company? Another city? Encourage your staff right away to take these first steps. Over time, they'll see the benefits: Networking can give them an opportunity to share information, advice, feedback and support.

For example, a programmer may call someone in his network for advice on a puzzling technical problem, to get input about a career move or to talk over a critical issue with someone who understands his job and is not a stakeholder in the outcome. On the flip side, he can pass along information that will benefit a colleague in some way or let her know that he's given her name to someone else who would like to connect with her.

Possibly without them realizing it, your staff members already have many opportunities to network with other IS professionals, clients or user groups in the same company; with colleagues from other companies they have had contact with in special projects and professional organizations; and with people from classes or conferences.

Urge your staff to take advantage of these opportunities to network. Those who are less timid might begin a connection with someone by introducing themselves at a class, conference or professional meeting; others might prefer initiating a written connection.

Another avenue is for an employee to call someone whose name has been passed along to him. If he is reluctant at first, remind him that most people enjoy being contacted as an expert or to discuss common interests.

The best networkers are those who go out of their way to pass along information or assistance to others. They always return phone calls, and they are active in keeping the energy moving. Remember, what goes out seems to come back multiplied — and not necessarily from the same contacts.

Even if you are not a natural networker, set a good example — network yourself; make it known in your group that you don't consider resources limited to people in your own group or company.

Networking nuggets

The next time you are tempted to deny an out-of-town class to someone on your staff because of the expense, consider the value of the networking opportunities. Networking with classmates adds a depth to the learning experience that can be missing from large in-house classes. Participants will return not only with technical knowledge but also with the experiences and opinions of others, which they can draw on later. It can't hurt you or your department to know how other companies solve related problems.

> THE BEST NETWORKERS are those who go out of their way to pass along information or assistance to others.

Networking is an unstructured, open-ended, intangible activity. Because of this, you won't find Networking 101 listed in a course booklet for professional development. IS managers, however, *can* play a big part in passing along techniques that can benefit their staffs and departments.

Redkey is an independent instructor, consultant and writer and author of *The Technical Instructor's Handbook: From Techie to Teacher.*

? What training issues would you like to see covered? Call Cathy Duffy, associate editor at *Computerworld*, at (800) 343-6474 or fax at (508) 875-8931.

COMPUTERWORLD

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"Computerworld Response Card Decks really opened doors to the 'heavy-hitter' accounts..."

Spectrum Concepts, Inc. is a 10-year-old software developer based in New York City. The company, which provides software and services to large corporations and financial institutions, recently developed XCOM 6.2, an LU 6.2-based software product that dramatically improves file transfer between different computing environments.

XCOM 6.2 eliminates the need for extensive custom programming when transferring data from one computer to another, including PCs, mainframes and minis. And it significantly lessens the amount of time necessary to complete connectivity projects.

Company president Alec Gindis was impressed with industry reaction after a news story announcing XCOM 6.2 appeared in *Computerworld*. So when Spectrum began implementing its marketing strategy for the new product, he considered *Computerworld* a key resource.

"Our goal was to generate sales leads from major organizations — Fortune 500 and Fortune 1000-type companies — that need to transfer files. We decided to use response card decks, and, based on the reaction we got to that product announcement, Computerworld's was the card deck we thought of first.

"And it's paid off; the results have been terrific. We've received hundreds of high-quality leads so far, and they're still coming in. In fact, Computerworld Response Card Decks really opened doors to the 'heavy-hitter' accounts — major organizations that learned about us through the cards.

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— Alec Gindis
President
Spectrum Concepts, Inc.

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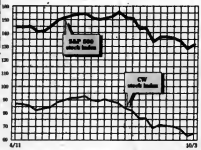

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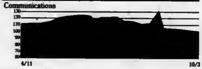

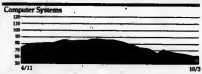

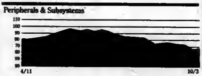

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EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN INFO TECHS CORP	68	53	62	2.3	3.5
Q	ANDREW CORP	28	16	17.75	0.0	0.0
Q	ARTEL COMM CORP	10	2	2.375	-0.4	-13.6
N	AT&T	47	30	31.5	0.0	0.0
Q	AVANTEK INC	6	2	2	-0.8	-22.0
N	AYDIN CORP	21	11	10.75	0.0	0.0
N	BELL ATLANTIC CORP	57	40	48	2.0	4.3
N	BELLSOUTH CORP	58	49	52.25	0.6	1.2
Q	COMPRESSION LABS INC	18	7	15.375	2.3	17.1
Q	CONTEL CORP	37	23	32.75	1.8	6.1
Q	DATA SWITCH CORP	4	2	3.125	-0.1	-3.8
Q	DIGITAL COMM ASSOC	27	14	18	-0.3	-1.8
Q	DYNATECH CORP	20	13	12.5	-1.3	-9.1
Q	FIBRONICS INTNL INC	13	8	6.5	-1.1	14.5
Q	GANDALF TECHNOLOGIES	8	2	2	-0.8	-28.8
N	GENERAL DATACOMM INDS	8	2	2.6	0.1	5.3
N	GTE CORP	36	24	27.6	1.4	5.3
Q	INFOTRON SYS CORP	10	2	2	-0.1	5.8
N	ITT CORP	64	44	46.625	0.0	0.0
N	M A COM INC	7	3	4.375	-0.5	-5.4
Q	MCI COMMUNICATIONS CORP	48	30	33.125	1.1	3.5
N	NETWORK EQUIP TECH INC	34	8	6.625	0.5	8.2
Q	NETWORK SYS CORP	16	7	9.125	0.1	1.4
N	NORTHERN TELECOM LTD	30	21	24.125	1.6	6.8
Q	NOVELL INC	28	12	25.25	0.0	0.0
N	NYNEX CORP	82	68	71.625	2.1	3.1
N	PACIFIC TELESIS GROUP	52	28	42.875	-0.4	-0.8
4	PENRIL CORP	8	5	6.125	0.1	2.1
N	SCIENTIFIC ATLANTA INC	29	13	14.25	0.6	4.8
N	SOUTHWESTERN BELL CORP	65	47	53.625	3.0	5.9
Q	3COM CORP	18	7	7.75	0.5	10.7
N	US WEST INC	41	32	36.25	1.5	4.4

Computer Systems

EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLIANT COMPUTER SYS	8	2	2	-0.5	-20.0
Q	ALPHA MICROSYSTEMS	7	1	1.375	-0.4	-21.4
A	AMDAHL CORP	18	10	11.125	0.1	1.1
Q	APPLE COMPUTER INC	50	27	27	-2.8	-9.2
Q	AST RESH INC	26	6	17.6	-0.1	-0.7
N	BOLT BERANEK & NEWMAN	8	4	5	0.1	2.8
N	COMPAQ COMPUTER CORP	68	37	41.625	1.1	2.8
N	COMMODORE INTNL	12	6	6.375	0.4	7.6
Q	COMPUTER AUTOMATION INC	6	0	1.188	0.7	137.6
N	CONTROL DATA CORP	22	8	9.25	-0.8	-7.6
N	CRAY RESH INC	61	27	27.6	-1.5	-5.2
N	DATA GEN CORP	16	5	4.875	-0.4	-7.1
N	DATAPOINT CORP	6	1	0.938	0.1	7.2
Q	DELL COMPUTER CORP	14	5	9.875	0.3	2.6
N	DIGITAL EQUIP CORP	93	50	52.5	1.5	2.9
N	FLOATING POINT SYS INC	4	0	1.625	0.0	0.0
N	HARRIS CORP	40	17	16.75	-2.3	-10.7
N	HEWLETT PACKARD CO	52	29	31	0.5	1.5
N	HONEYWELL INC	112	73	82	-1.5	-1.8
N	IBM	123	93	107.375	2.0	1.8
Q	INFORMATION INTL INC	16	8	9.25	0.1	1.4
Q	IPL SYS INC	14	5	8	-0.3	-2.7
N	MAI BASIC FOUR INC	6	2	1.75	0.1	7.7
N	MATSUSHITA ELEC INDL LTD	172	116	137.5	21.5	18.5
Q	MENTOR GRAPHICS CORP	26	10	10.5	-1.6	-14.2
N	NBI INC	2	0	0.188	0.0	33.3
N	NCR CORP	72	64	58.5	3.1	6.8
Q	PYRAMID TECHNOLOGY	26	14	16.625	-1.4	-7.8
Q	SEQUENT COMP SYS INC	34	13	14.25	-5.8	-28.5
Q	SUN MICROSYSTEM INC	37	16	19.5	-8.3	-29.7
Q	SYMBOLICS INC	2	0	0.25	-0.1	-20.1
N	TANDEM COMPUTERS INC	30	10	11.125	0.3	2.6
N	TANDY CORP	48	24	28.125	0.3	1.0
N	ULTIMATE CORP	10	3	3.25	-0.5	-18.8
N	UNISYS CORP	20	3	4	-3.0	-42.9
4	WANG LABS INC	8	3	3.125	0.1	4.2

Software & DP Services

EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	AMERICAN MGMT SYS INC	20	11	13.625	1.1	8.0
Q	AMERICAN SOFTWARE INC	18	6	8	0.1	1.6
4	ANACOMP INC	8	2	1.875	-0.1	-8.3
Q	ANALYSTS INTL CORP	24	10	10.6	-0.5	-4.5
Q	ASHTON TATE	15	5	5.25	-1.0	-16.0
Q	ASK COMPUTER SYS INC	10	6	6.375	-0.8	-10.6
N	AUTO DATA PROCESSING	60	44	48.25	-0.4	-0.8
Q	AUTODESK INC	60	23	37	-5.3	-12.4
Q	BMC SOFTWARE INC	30	18	22.75	-0.8	-2.2
N	BUSINESSLAND INC	12	2	2.125	0.1	6.3
Q	COGNOS INC	10	4	6.75	-0.3	-3.6
N	COMPUTER ASSOC INTL INC	17	4	4.875	-0.8	-13.3
Q	COMPUTER HORIZONS CORP	17	7	11.25	-0.5	-4.3
N	COMPUTER SCIENCES CORP	68	37	40.125	2.4	6.3
N	COMPUTER TASK GROUP INC	12	8	8.5	1.0	11.5
Q	COMSHARE INC	25	14	16.5	0.5	3.1
Q	CORPORATE SOFTWARE	18	8	8	-0.6	-5.3
N	GENERAL MTRS (CLS E)	38	24	33.75	0.9	2.7
Q	GOAL SYSTEMS INTL	16	10	10.25	0.3	2.6
Q	HOGAN SYS INC	7	2	2.75	0.0	0.0
Q	INFORMIX CORP	18	9	4.75	-0.5	-13.6
Q	INTELLICORP INC	8	3	3.375	-0.1	-3.8
Q	LEGENT CORP	22	17	18.875	-0.1	-0.7
Q	LOTUS DEV CORP	29	14	16.75	1.1	7.2
Q	MICROSOFT CORP	81	34	65.75	9.5	6.1
Q	NATIONAL DATA CORP	25	8	9.5	-0.4	-3.8
N	ON LINE SOFTWARE INTL INC	11	5	5.375	-0.5	-8.5
Q	ORACLE SYS CORP	168	6	5.625	-0.6	-10.0
N	PANSOPHIC SYS INC	18	10	10.25	0.3	2.5
Q	PHOENIX TECHNOLOGIES INC	8	2	2.125	-0.3	-10.5
N	POLICY MGMT SYS CORP	43	30	36.125	0.5	1.4
Q	PROGRAMMING & SYS INC	25	12	13.25	-2.3	-14.5
Q	RELATIONAL TECH INC	10	3	8.875	0.5	6.0
N	REYNOLDS & REYNOLDS CO	27	13	14.5	1.5	11.5
Q	SAGE SOFTWARE INC	19	8	8.875	0.6	8.2
Q	SEI CORP	22	16	15.5	0.6	3.3
Q	SHARED MED SYS CORP	17	12	16.75	-0.5	-3.1
Q	SOFTWARE PUBG CORP	28	14	16.75	-0.8	-25.9
N	STERLING SOFTWARE INC	11	6	5.75	-0.3	-4.2
Q	SUNGARD DATA SYS INC	28	15	18.5	0.6	4.5
N	SYSTEM CENTER INC	25	8	9.25	3.3	84.2
N	SYS. SOFT INC	29	14	15.75	-1.0	-6.0
Q	WORDSTAR	2	1	0.513	-0.1	-13.3

Semiconductors

EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADV MICRO DEVICES INC	11	5	8	-0.4	-7.0
N	ANALOG DEVICES INC	10	6	6.25	0.1	2.0
Q	ANALOGIC CORP	11	6	5.375	0.0	0.0
Q	CHIPS & TECHNOLOGIES INC	26	6	6.5	-1.5	-16.0
Q	INTEL CORP	52	30	33.25	0.5	1.5
Q	MICRON TECHNOLOGY INC	16	7	6	-0.8	-5.9
N	MOTOROLA INC	88	53	64	3.4	5.8
N	NATL SEMICONDUCTOR	8	4	3.875	-0.3	-8.1
N	TEXAS INSTRS INC	44	25	26.75	0.1	0.5
A	WESTERN DIGITAL CORP	16	6	6.25	0.1	2.0

Peripherals

EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLOY COMP	2	0	0.469	0.0	-8.2
N	AM INTL INC	6	1	1.375	0.1	10.0
Q	AUTO TROL TECH CORP	6	2	2.25	0.5	28.6
Q	BANCTEC INC	24	13	12.75	-0.3	-1.6
4	COGNITRONICS CORP	8	3	8	0.6	14.3
Q	CONNER PERIPHERALS	31	11	17	-0.5	-2.9
A	DATARAM CORP	22	8	10.375	0.3	3.1
N	EASTMAN KODAK CO	49	28	37.25	-1.5	-4.8
N	E M C CORP MASS	7	3	6.125	-0.3	-3.8
Q	EMULEX CORP	8	8	6.375	-0.1	-1.5
Q	EVANS & SUTHERLAND	26	18	21.5	-1.0	-4.4
Q	ICOT CORP	2	1	0.563	-0.1	-14.3
Q	INTERLEAF INC	8	3	3.375	0.5	17.4
Q	IOMEGA CORP	6	3	4.563	0.1	2.8
Q	MASSTOR SYS CORP	3	1	0.563	0.0	0.0
Q	MAXTOR CORP	17	6	5.75	-0.3	-4.2
Q	MICROPOLIS CORP	10	3	5.25	0.3	5.0
N	MINNESOTA MNG & MFG CO	91	68	78.25	0.3	0.3
Q	PERSONAL COMP PRODUCTS INC	6	4	3.813	0.0	0.0
Q	PRINTRONIX INC	16	9	10.25	0.8	7.9
N	QMS INC	21	9	11.625	0.9	8.1
Q	QUANTUM CORP	26	9	19.5	-0.8	-3.6
N	RECOGNITION EQUIP INC	8	8	6.125	0.1	2.5
Q	REXON INC	10	4	4.875	0.3	5.4
Q	SEAGATE TECHNOLOGY	20	6	6.625	-0.3	-3.8
N	STORAGE TECH CORP	28	12	12.75	-0.9	-6.4
Q	TANDON CORP	4	1	1.813	0.3	16.0
N	TEKTRONIX INC	16	12	16.875	1.1	6.2
Q	TELEVIDEO SYS INC	1	0	0.25	0.0	0.0
N	XEROX CORP	67	32	34.875	2.3	6.6

Leasing Companies

EXCH		52-WEEK RANGE		PRICE CLOSE OCT. 3, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
N	CAPITAL ASSOC INTNL INC	7	1	1.063	0.1	6.3
N	COMDISCO INC	34	15	16.875	1.8	11.5
Q	LDI CORPORATION	16	11	11.25	-0.6	-4.3
Q	PHOENIX AMERN INC	6	3	4.5	1.3	38.5
Q	SELECTERM INC	6	3	3.313	0.4	15.2

EXCH: N—NEW YORK; 4—AMERICAN; Q—NATIONAL

Loop d'loop

Tech stocks take a ride that leaves many in the doldrums

Technology stocks roller-coastered up and down last week, leaving some firms derailed at new lows and others chugging ahead by Thursday's close. Hewlett-Packard Co. was among those left feeling queasy at the end of the ride, having lost 4¼ points last week to close Thursday at 29¾. HP could have shared the motion sickness pills with Autodesk, Inc., which also plunged 4¼ points, closing at 37¾.

Financial troubles and analyst grumbles caused Unisys Corp. to stumble 1⅝ points last week to close Thursday at 3⅝, just a breath away from a new low. Digital Equipment Corp. slid 1⅞ points to 50¼, hovering just above its low mark set two weeks ago. IBM was one of the few gainers in the hardware sector, shooting up 1½ points to 107⅞.

With a few exceptions, software makers withstood the herky-jerky Wall Street ride and came out grinning. Adobe Systems, Inc. gained 1¾ points to 20¾. Lotus Development Corp. surged 1½ points to 17, while Microsoft Corp. rose 1½ points to 64⅛.

However, Software Toolworks, Inc. pitched and rolled, then pitched once more, finally sinking 2 points to 4⅝. Oracle Systems Corp. continued to lag, losing ½ a point to close at 6.

Traders did not take kindly to news of a possible legal battle between Intel Corp. and Advanced Micro Devices, Inc. (AMD) over rights to the 80386 chip. AMD lost ¼ of a point and sunk to a new low of 4⅞, while Intel declined by 1 point to 32¼. Other semiconductor makers also suffered: Motorola, Inc. tumbled 2½ points to 60½, and National Semiconductor Corp. slid ⅜ of a notch to 3⅜, a new low.

Cray Research, Inc. sold its Y-MP supercomputer to a Japanese company, then investors sold Cray stock, sending it down 1¾ points to 26¼, a new low.

KIM S. NASH

RISC

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computer. Users are not exactly thrilled with this vision of the future. First, the idea of using RISC is to lower costs, including the costs of informations systems staffing. Second, with no unified Unix, there is no cohesive central management available.

"We found the fact that there are different Unixes out there to be a tremendous disadvantage," said Gerald Siddons, who is director of scientific computing at the division of biostatistics and epidemiology at the Dana-Farber Cancer Institute in Boston. "Even if only 10% of the code is machine-specific, that's still a lot of work."

The lack of a unified Unix is creating havoc in systems administration. "Our biggest concern about the differences in Unix is not from a user's view, because that's getting cleaned up, but in systems administration," said Tom Hein, manager of technical support at John Deere Insurance Co. in Moline, Ill. "There's a significant difference between Unixes."

"They're looking for a standard way to manage what they buy," said John Jones, an analyst at Montgomery Securities in San Francisco. "It's a management headache."

Only in the last few months have two vendors, Sun Microsystems, Inc. and HP, announced management software for their RISC systems. However, it comes bundled with their hardware, thus limiting the open systems aspect.

Despite the chaos of operating system differences and lack of management tools, RISC hardware forges ahead.

RISC vendors have dribbled their first-generation products into the market over the last four years. Now that they're in the marketplace, most said they expect to double the speed of their RISC processors in the next year.

As a buyer, which model is best for you? Analysts said to ignore the minor differences in vendors' claims and take one for a test drive — benchmark it on the application you expect to use.

The next generation

Most RISC vendors say they plan to double the speed and performance of their processors during the next year

Product	Availability	MIPS	Spec marks	Clock speed
HP	1990	50	N/A	48 MHz
Sun	1991	80	86	40 MHz
Intergraph	1991	48	N/A	50 MHz
Mips	1991	40	35.2	N/A
Motorola	1991	72	N/A	50 MHz
IBM	1991	70	58	50 MHz
Intel	1991	50	41	50 MHz

CW Chart: Paul Mock

RISC's leaps in price/performance will continue in 1990. Many vendors said they will have uniprocessors that provide more than 50 million instructions per second, or MIPS (see chart). Longer-term plans for increasing price/performance center on multiprocessing.

"In the long run, they'll get more price/performance from multiple CPUs than from the shrinking geometry on a chip," said Kim Shanely, secretary of the benchmarking group System Performance Evaluation Cooperative (SPEC).

While vendors have different methods of implementing processors under the umbrella of RISC, they appear to have little to differentiate themselves in future generations outside of marketing.

The major players (HP's Apollo Division, IBM, Intel Corp., Intergraph Corp., Mips Computer Systems, Inc., Silicon Graphics, Inc. and Sun) all claim that certain engineering features in their implementations of RISC offer distinct advantages to users.

However, instead of wading through technical claims, users and analysts, such as Don Tapscott, vice-president of Boston-based DMR Group, Inc., suggested that potential buyers should find out whether a certain vendor's architecture is right for them by running benchmarks themselves for the necessary applications.

Trial and error

After studying more than 100 Unix users, most of whom are Unix RISC users, Tapscott said that all those engineering differences matter little. "There are important differences in terms of price/performance," he said, recommending that users simply benchmark applications that they plan to use. "You'll find out fast enough which is best for you."

This attitude points out the future prominence of SPEC and other benchmarking organizations such as Neal Nelson's Business Benchmark and the Transaction Processing Council.

SPEC released its first suite of benchmarking results in April. Users can either subscribe to the organization's newsletter and check potential hardware for aggregate performance on about a dozen applications or benchmark their own computers through tapes that are available from the Fremont, Calif.-based organization.

However, users such as Hein said that until benchmarks are more thorough, even the second generation of RISC computers should be tested on applications.

"In the PC world, you eventually believe what you read. The Unix world is not quite that easy," he said. Specmarks (the results of SPEC's testing), he said, may eventually make buyers comfortable, but because the organization has only technical application benchmarks, it still is not widely usable.

Software

Until there is a unified Unix, if there ever will be one, applications present the biggest obstacle to both users and vendors.

As RISC architecture insinuates itself into the commercial world, users would rather buy shrink-wrapped software. John Mercer, pagination project coordinator at *The Houston Chronicle*, said that he buys shrink-wrapped applications whenever possible for the company's Sun workstations. "We won't get into something that calls for [recompilation] unless we have to," he said.

Jones agrees: "The reality is once you're out of the engineering side of an organization, we're all a bunch of dummies," and recompiling is out of the question.

Vendors have further divided the issue. Instead of making Unix more alike, they have been avidly pursuing independent software vendors, often offering them money to port applications to their particular flavor of Unix. Until there is a unified Unix, these deals have been the only way for vendors to get applications for their hardware, but it has the effect of entrenching the separate flavors of Unix.

Sun and Mips — and to a lesser extent Motorola, Inc. and the rest — have programs that entice third-party software developers. Those who have been in the RISC arena longest have the biggest portfolio of applications. The rest admitted they are at a disadvantage. "What hurts us is that it takes longer to get applications going," said Jeff Nutt, marketing manager for Motorola's RISC line.

Applications key

It is no surprise that RISC and its attendant Unix operating system are limited by software applications, despite the monumental efforts by vendors to get more applications to the market.

One future remedy could be that when the architecture gets to the point where it has MIPS to burn, some of those MIPS will be burned up camouflaging the differences in flavors of the operating system and automatically tuning it to the hardware. Vendors said they see it as a possibility but would rather see those MIPS used for software to differentiate their own RISC systems from the rest, rather then bring them together.

"Camouflaging the operating system through another level of software is an unproven idea," said Phil Gerskovich, manager of Scalable Processor Architecture alliances at Sun. Bill Keating, director of corporate technology marketing at Sun, added, "As [RISC] has more power, those MIPS will be used for more functionality first."

RISC CPUs to yield enhanced price/performance in 1991

BY J. A. SAVAGE
CW STAFF

In the 1991 batch of reduced instruction set computing (RISC) processors, vendors will get their nudge in price and performance in two ways. Increasing clock speed, all agreed, is most easily done. Second, most vendors are experimenting with some form of increasing the number of instructions per clock cycle.

In the current generation, a 33-MHz clock speed did not just roll off the fabrication line. It was first achieved by hand-picking chips tested at higher rates, according to John Mashey, vice-president of systems technology at Mips Computer Systems, Inc.

To reach 50 MHz, where most vendors said they will be by next year, engineers are fine-tuning the circuits on the chips. "You find one path takes longer than the others, so you rearrange it to make it shorter," Mashey said.

Additionally, this next batch of RISC CPUs will gain performance in board layout. By putting cache on the CPU substrate, "it will look more like a chip than a circuit board," he said.

Trying to cram more instructions through the processor for each clock cycle is a bit more tricky, according to vendors. They are attempting two methods to accelerate the instruction. One is to widen the instructions pathway so that two instructions can be sent at once, side by side. The other is to stagger the instructions so that several can be sent for each clock cycle.

However, the ability to leverage the clock speed and instruction paths appears limited to the 1991 generation. The price/performance kick after that will most easily be achieved by stringing processors together, the vendors said.

Patriot dreams

As the Open Software Foundation and Unix International creep toward some version of a unified Unix operating system, one new company may obviate the need for their efforts and users' need to recompile applications to match hardware with each vendor's version of Unix.

IBM and Metaphor Computer Systems, Inc. recently announced a new business called Patriot Partners. Its aim is to shield software developers from the different flavors of Unix by writing a layer of code between each flavor of Unix and general applications.

If successful, the business would not only ease the headache of software developers having to tune applications for each version of Unix, but by wiping out the differences between Unix software packages, it would also make software applications more plentiful, as any created for a particular version would then run on all versions.

Users of reduced instruction set computing (RISC) architecture may not be inherently tied to Unix as an operating system. Microsoft Corp. plans a "portable OS/2" operating system, which could be used on a RISC platform in the next few years.

Although the company announced OS/2 for RISC plans, it is not pushing the product. "It's primarily for [Intel Corp.'s] X86 [processor line] platforms," said Pat Bellamah, OS/2 marketing manager at Microsoft.

Microsoft has not said which vendor's RISC architecture it will port to first, as each has to be specially tuned, but it has said that the product will support multiprocessor RISC architecture.

J.A. SAVAGE

NEWS SHORTS

Huge outsourcing pacts inked

Sun Refining and Marketing Co. finalized its 10-year, $200 million outsourcing contract with Andersen Consulting last week. The previously announced deal (CW, Aug. 6) calls for Andersen to acquire Sun's Dallas data center and hire 66 Sun operations employees. In a separate processing services announcement, the U.S. Environmental Protection Agency (EPA) extended its 13-year-old relationship with Computer Sciences Corp. and announced a five-year, $347 million contract for computer and telecommunications services to the EPA.

Antivirus organization seeks input

The National Institute of Standards and Technology (NIST), an agency of the U.S. Department of Commerce, said last week that it is considering the establishment of a government/industry consortium to combat computer viruses and similar threats. The NIST is soliciting industry comment on the idea and asked that organizations interested in the consortium contact Dennis Steinauer at NIST, Room A216 Technology Bldg., Gaithersburg, Md. 20899. (301) 975-3359.

Groups look to extend chip pact

The Computer Systems Policy Project and the Semiconductor Industry Association, groups whose goals have not always coincided, said they sent a letter last week to President Bush stating a unified position on matters related to U.S./Japanese trade. The groups said they want: the U.S. and Japan to extend an agreement on open markets and dumping, due to expire next July, for five years; the U.S. to boost its share of the Japanese semiconductor market from 13% to at least 20% by the end of 1992, one year later than had earlier been demanded; in light of recent successes, the government to reduce its role in antidumping matters; and the U.S. to remove the price floors set for sale of dynamic random-access memory chips and erasable programmable read-only memory chips in the U.S. by Japanese suppliers.

Microsoft releases driver library

Microsoft Corp. has announced the Microsoft Supplemental Driver Library (SDL), a collection of device drivers for printers, video displays, pointing devices and other peripherals that run under Windows 3.0. The library supports approximately 126 hardware peripherals, including a variety of Hewlett-Packard Co. Laserjet printers. The SDL, which can be freely copied and distributed among licensed Windows users within a company, will be available at no charge with a variety of distribution options and can be downloaded from such on-line services as Microsoft Online, Compuserve and Genie. SDL can also be ordered by calling (800) 426-9400.

Mac/IBM connections unveiled

Apple Computer, Inc. Macintosh users needing a connection to IBM System/34s, System/36s, System/38s or Application System/400 machines can look to two new Macintosh midrange products from Andrew Network Products in Austin, Texas. The first is Netaccess, an Appletalk gateway that connects Macintoshes to the IBM midrange and costs $3,995. The other is Mactwin, priced from $995 to $1,095, which offers the features of Netaccess for point-to-point networking and includes a card for the Macintosh's internal expansion slot.

Cabletron enters FDDI market

Cabletron Systems, Inc. said it plans to unveil a $19,995 Ethernet-to-Fiber Distributed Data Interface (FDDI) bridging module for its Multimedia Access Center (MMAC) at this week's Interop '90 show in San Jose, Calif. The MMAC is an intelligent wiring center that allows users to link disparate local-area networks running over various media in a star configuration, a popular strategy these days because it simplifies network management. The FDDI support joins Cabletron modules supporting Ethernet over thin and thick coaxial cable and unshielded twisted-pair, as well as token-rings running over fiber, and shielded and unshielded twisted-pair.

Notes

FROM PAGE 1

for," said John Dunkle, a consultant at Workgroup Technologies.

There's an incompatibility between Lotus' desire to position Notes as a strategic corporatewide environment and users who expect Notes will prove its worth but still want a starter pack.

"If you really believe Notes is worth it, then the product should be its own best salesman," insisted Russ Baris, assistant director of pharmaceuticals systems at Pfizer Pharmaceuticals in New York. Baris' colleague and Notes fan Todd Greeno, who is a systems manager, agreed. "The major issue we have is that most corporations tend to start small, using the success of a pilot to sell it to management."

"Notes [requires] a substantial investment, and it's also difficult to explain to people," added Glen Jurmann, a section manager for the Office Technology Group at Baxter Healthcare Corp. in Deerfield, Ill.

Also difficult to say is how the product will fit into the organization, Greeno said, adding that he cannot find that out unless he tests it.

Another issue raised by Baris is one of centralized vs. decentralized purchasing. In his view — and Lotus seems to agree — Lotus is targeting information systems managers who purchase enterprisewide systems, rather than the department-level managers who purchase desktop software. "It forces us to find different sponsors than the ones who were interested in making the initial investment."

"We are targeting the IS manager or above level — even people often not in the IS chain of command," agreed Brownell Chalstrom, director of business development at Lotus' Communications Systems Group. Price Waterhouse, for example, purchased 10,000 packages, while Electronic Data Systems Corp. in Germany recently bought about 1,400 to start.

Chalstrom claimed that two other Pfizer employees in another group appear ready to make a purchase. "If you just toss Notes into an organization, it doesn't go anywhere," he said.

Lotus' Rokoff *says training will be key to Notes' success*

Yet Texaco, Inc., innovative Notes supporter Brad Jackson sold chunks of one Notes package to various work groups. Out of these pockets of success, he predicts a jump in Notes sales next year. "I was very disappointed in [Lotus'] 'IT czar' approach," he said.

Chalstrom maintained that for qualified prospects, Lotus "will work out arrangements where the customers can do whatever they have to do to convince themselves" that Notes works. He claimed that every customer who has taken advantage of this program has ended up buying Notes. Lotus is working very closely with the "several dozen customers we do have now."

Baris said his Notes sales team has offered what it considers to be creative arrangements, "but it comes down to the issue of if you don't make the $62,500 minimum purchase after a certain period, they'll yank out [what you've got]. And that will leave some users committing to Notes in the lurch."

Closing the window

David Marshak, an analyst at Patricia Seybold's Office Computing Group, said he believes that if this issue keeps Notes from getting onto the "right" person's desk for long enough, that will provide an opportunity for a pending ground swell of related tools in the conference communications and text database areas. "There are great risks in the approach that Lotus is taking," said Marshak, who is also a Notes supporter.

"We have always said that we intend to go into wider distribution, and I guarantee you that a year from now, the sales strategy you see today won't be the only one," Chalstrom said.

There are other issues. Jurmann finds Notes impressive but has technical concerns. It's unclear how Notes will fit into Baxter's Systems Network Architecture. He'll have to junk or update his Intel Corp. 8088- and 8086-based computers, and along with some Texaco employees, he wants calendaring. Lotus needs to correct a problem with replicating servers — one update can wipe out another, according to Paul Norris, a Gartner Group, Inc. analyst — and provide Notes application programming interfaces for developers.

Solving the marketing puzzle

From the start, Lotus has pondered aloud how to properly market Notes, possibly the most sophisticated, if not complex, groupware product available today. These issues still need to be worked out (see story page 1), yet where Notes has gained a foothold, it has won big. Even the hesitant offer kudos.

Most users say Notes goes well beyond basic groupware. It integrates multidimensional electronic mail, computer conferencing and text and data management into an enterprisewide system. Notes saves time and expense by letting users communicate without any direct contact via electronic "nonmeetings," said Brad Jackson, a Notes enthusiast at Texaco, Inc. It also serves as an applications platform.

Lotus is moving quickly to turn enthusiasm into sales — doubling the Notes sales force and translating the program into French and German.

Two major components of Notes' success will be training and support, said June Rokoff, vice-president of Lotus' Communications and Information Services Group.

"Clients are asking not just, 'How do I use this?' but, 'How do I explain to the organization why we'd want to do something like this?' "

Her approach is to put a few of the clients' key business applications on Notes and then talk with users about them.

Lotus is not geared to support small users of Notes, she said. "If they haven't made the mental leap, then we aren't ready to support them." Rokoff said she would like to do "smaller things" someday with Notes, but that will require a "distribution mechanism." Meanwhile, Notes users are asked to make a "people commitment" to the product, she said.

The Notes Alliance Program provides users with support specific to their vertical markets. The still-emerging Consulting Services Group may focus on helping clients deploy, integrate and target Notes, Vice-President Frank Moss said. His consulting services group can also offer unique customization skills and help users change the way in which they work, Moss said.

PATRICIA KEEFE

Analysts: HP reorg puts Young on hot seat

BY J.A. SAVAGE and NELL MARGOLIS
CW STAFF

PALO ALTO, Calif. — Capping persistent rumors that Hewlett-Packard Co. Chief Executive Officer John Young's days are numbered, the company late last week said his job, if not his title, will be shared for an unspecified period of time with Chief Operating Officer Dean Morton.

In addition to shared management, the company is streamlining its computer-oriented units by combining them into two separate divisions. One division will include networking, workstations and systems; the other will be made up of personal computers and peripherals.

"We'll be sharing the management of the company, as a whole, more broadly than before," Morton said of his new duties with Young. Morton added that his views in running the company are not "substantially different" from those of Young.

Analysts who have been predicting that Young is leaving the company see it differently. "They're effectively taking two executives who have been perceived as warring and stuck them in the same room," said John Jones, an analyst at Montgomery Securities in San Francisco. Other analysts have expressed concern in the last few weeks that the company is too decentralized and needs a stronger central CEO.

While most analysts saw the creation of the jointly occupied "Office of the Chief Executive" as signaling that Young is on his way out, "What it does not necessarily mean, however, is that Dean Morton is in," said Bob Herwick, an analyst at Hambrecht and Quist, Inc. in San Francisco.

"There are basically two scenarios," he said. "Scenario one: Dean [Morton] cuts it and becomes the new CEO. Scenario two: Dean [Morton] doesn't cut it, and he's on his way out. In true Hewlett-Packard fashion, they're going to do this thing evolutionarily."

Plan for the future

Morton denied that he will inherit the office, as both he and Young are 58 years old: "Clearly, we have to plan for [retirement] and positon others to help the organization move along." Young has been at HP's helm since 1978.

An HP spokeswoman denied that the move was at the behest of the board of directors, as several analysts have indicated. However, Hambrecht's Herwick claimed the reorganization "was driven by [HP co-founder] David Packard," whom, he said, is "displeased with Young's performance." Packard was not available for comment.

Morton said that the regrouping is an attempt to "flatten the organization and increase the amount of accountability among business units." He added that HP's computer business has been increasing in its complexity, particularly with HP's commitment to open systems. The reorganization will give the divisions a "clearer sense of how they fit" into HP's business plan, according to Morton.

Not much user concern

The general sense among users contacted regarding HP's reorganization is that the move is designed to appease Wall Street more than anything else and therefore will have little impact on customers.

One user, who asked to remain anonymous, said the change in management is really no change at all. "John Young was always making a presentation or speech somewhere. I felt that Dean [Morton] had charge of the day-to-day operations anyway."

"HP has improved over the last few years," said John Robinson, director of corporate information systems at Cox Enterprises, Inc. based in Atlanta. "I had no problem in the way the organization was run under John Young."

"I'm more interested in what the new lineup will be," said Isaac Blake, technical support coordinator for the city of Tempe, Ariz. "The rest is HP's business as long as there's a continuity of service and the user doesn't end up on the short end of the stick."

IBM makes good on several previous printer promises

BY JEAN S. BOZMAN
CW STAFF

BOULDER, Colo. — IBM upgraded its top-down approach to enterprisewide printing last week, replacing a 15-year-old system with a model that fulfills several promises made during recent years and retaining the IBM mainframe as the hub for centralized output.

The IBM 3900, priced at $289,000, is intended as a central-site continuous-feed printer, IBM product managers said. Large firms use the 3900's predecessor, the IBM 3800, to print telephone and utility bills, direct-mail advertising and large documents. The 3900 is scheduled to ship in the second quarter of 1991.

Coupled with Advanced Function Printing (AFP) Release 2.0 software, the IBM 3900 plays a role in the production of enterprisewide documents. The AFP Release 2.0 software allows users to format documents, assign page numbers and handle data compression. It also supports IBM's Print Services facility for MVS, VM and DOS/VSE hosts, supporting the merger of data, text and images.

The Xerox Docutech Production Publisher, which was also announced last week, is not a replacement for the Xerox 9790, a data center printer that will continue to compete with the IBM 3800 and 3900. However, analysts said, Docutech represents a bottom-up approach to printing because it collects information from downstream workstations and local-area networks.

"IBM is putting forward the [Systems Application Architecture] view of distributed processing," said Brandon Nordin, an analyst at BIS CAP International, Inc. in Norwell, Mass. "But in a small company that uses [personal computers] and Apple Macintoshes and Digital Equipment Corp. VAXs as network servers, you wouldn't have access to those centralized IBM printers."

Acting through the network, IBM's AFP supports "distributed printing," in which host-generated documents can be printed at different locations. "The mainframe acts as a central storage device and as a mediating device that controls print access," Nordin said. "This gives an IS manager the ability to distribute print jobs, to bring some printers down for maintenance while others are running or to reallocate the work load if one site has a power failure."

The IBM 3900 prints 229 pages per minute, using continuous rolls of fanfold paper. As such, it serves as an upgrade for the estimated 10,000 slower IBM 3800s deployed worldwide.

Xerox unveils multitalented printer

BY JOHANNA AMBROSIO
CW STAFF

NEW YORK — Is it a scanner that also copies or a printer that also scans? Actually, it is both.

Xerox Corp. unveiled what analysts are calling one of the first "hydra" products: a combination printer, scanner and copier that produces offset-quality documents and booklets. The machine, first in the Docutech Publishing Series, is aimed at electronic publishing applications in large companies.

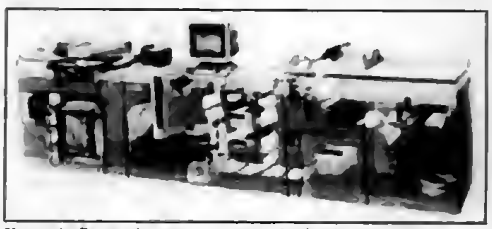
Although observers were impressed with Docutech's technology, some questioned Xerox's ability to sell such a complex machine and wondered whether the product will erode sales of the firm's high-end printers and copiers.

Xerox executives were not shy about hyping the machine. "This is a big day for Xerox and for the industry," said Paul Allaire, president and chief executive officer of Xerox.

Docutech's big advantage, executives said, is its ability to digitally scan and store images in the unit's memory. Users can then request prints or copies to be made from memory. A computer monitor allows machine operators to manipulate images to enlarge or reduce certain items or to change their placement on the document.

The machine can also accept input from a floppy disk. It scans up to 23 documents per minute at a resolution of 600 dot/in. and can print up to 135 copies per minute on regular-size paper. It also handles 58 prints per minute on 11- by 17-in. paper. Docutech costs $220,000.

A networked version will be available next year. This will allow users to create a document at their workstations and send it electronically to Docutech to print. Xerox is working with partners to allow third-party publishing, local-area networks and word processing software to work with Docutech. These partners include Aldus Corp., Interleaf, Inc., Novell, Inc. and Wordperfect Corp.



Xerox's ***Docutech can scan, copy and print from memory***

Over time, Xerox executives said, the networked version will work with many different types of personal computers, workstations and communications protocols.

Docutech was beta-tested at 28 sites, including World Bank in Washington, D.C. "It works; it does everything they say it does," said Charles Salagiver, senior production control clerk. However, the bank has not yet purchased a unit because "we're taking a step back to see what it can do for us."

Indeed, some observers wondered who will buy the Docutech — information systems departments, print shop supervisors or department managers. Xerox has said it will sell into all three places, but "they have not been successful in their past attempts to talk to MIS people," said Joel Levy, managing consultant at Goldstein Golub Kessler & Co. in New York. "I think it will be a successful product; I just wonder how successful it will be."

Angele Boyd, manager of printer research at International Data Corp. in Framingham, Mass., said that Docutech may hurt some of Xerox's high-end copier sales.

Midwest correspondent Michael Fitzgerald contributed to this article.

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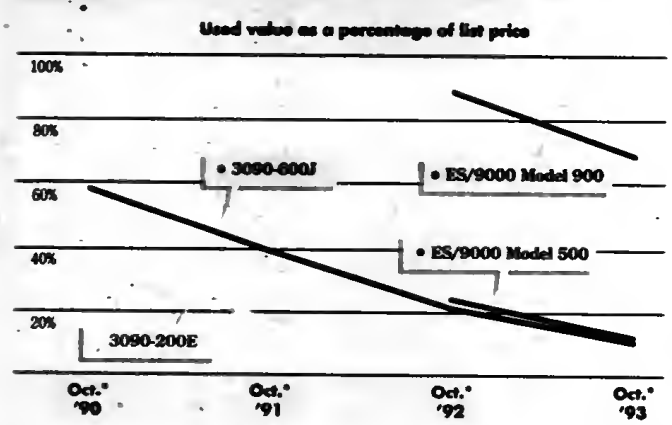
TRENDS

IBM mainframes

Estimates of residual values show that high-end ES/9000s will hold their value best

Model	List price (in millions)	Residual value (in thousands) Current used price	Oct.* '91	Oct.* '92	Oct.* '93
3090-300E	$4.8	$1,550	$868	$458	$193
3090-400E	$10.2	$5,000	$2,335	$1,244	$541
3090-600J	$13.2	$7,709	$5,105	$2,757	$1,438
[illegible]	$4.4	–	–	$1,073	$527
[illegible]	$11.1	–	–	$3,284	$1,517
[illegible]	$22.8	–	–	[illegible]	$15,693



*Projected

Source: Computer Economics, Inc., Carlsbad, Calif.

CW Chart: Paul Mock

NEXT WEEK

Howard Ory is a lot of things — a physician, an epidemiologist, a birth control expert and an articulate talk show guest. However, the director of information resources at the Centers for Disease Control in Atlanta is definitely *not* your typical information systems director. Find out more about him in a Manager's Journal profile.

Cyberspace, according to science fiction/cyberpunk writer William Gibson, is already here. Or there. In a new essay, Gibson explains that technology has generated a new territory: "a Wyoming writhing in some eerie interstice between concept and silicon." In Depth also has an excerpt from Gibson's forthcoming book, *The Difference Engine.*

INSIDE LINES

Windows 3.0 redux

Look for the next version of Microsoft's Windows graphical interface to appear in the first half of next year. Microsoft insiders say Windows 3.1 will include a better interface, improved network support, multimedia extensions and Microsoft's and Apple's collaborative Truetype scalable-font technology built in. Microsoft engineers are reportedly also working on a version of Windows that will recognize handwriting.

Where does this leave OS/2?

Still confused over the "extension" of the IBM/Microsoft development agreement that placed OS/2 squarely as an IBM responsibility? Microsoft head Bill Gates isn't. "In terms of volume, Windows has won, and it's important for us to enhance that," he said during last week's Seybold Publishing Conference. "In terms of the mainstream, Windows is it." That must leave IBM downstream — or perhaps downwind?

Coincidental tourists?

Four vice-presidents have recently resigned from Data General to "pursue other business interests," a company spokesman said. Departing from the Westboro, Mass.-based headquarters are: John Kavazanjian, vice-president of the PC and terminal business unit; Fred Cochrane, vice-president of product engineering; Thomas Palka, vice-president of U.S. sales; and Robert Tway, divisional vice-president of eastern operations, a position that reports to Palka.

Must be that Pepsi training

No one batted an eye last week when Apple CEO John Sculley described one of his company's new commercials as "based on a true story, not one of those truths we had to create." Maybe Sculley's been watching too many playbacks of Apple's award-winning commercial takeoff on George Orwell's acclaimed novel *1984.*

This is only a test

Novell's network naming service for Netware 386 Version 3.1 is on again. At last report, the Provo, Utah-based firm was giving beta-test sites its remote management software to test in place of the naming service. That has switched, and one beta tester installed the naming service on a production server and watched it zap every password and scramble log-ons.

Does your phone bill make you sick?

1st Defense Anti-Viral Systems in Broadview Heights, Ohio, said it has discovered a virus designed to run up a telephone bill on a PC with a modem. The company said the new virus, dubbed the Telecomm Virus or V92, was unearthed by a couple of Texans who, as luck would have it, had copies of 1st Defense's antivirus software. A cynical virus tracker we know can't help wondering if there is a connection.

Brave new world

Microsoft is very serious about multimedia, company product manager Cornelius Willis said at last week's CD-ROM Expo in Boston. The firm is committing $12 million this year to development of systems software and support of both in-house and independent "titles" (don't call them applications). Also, the multimedia "extensions" planned for the next version of Windows will include search functions, which may place vendors offering text search/retrieval software in the position of having to choose between toeing the Microsoft line or risking the market moving out from under their feet.

While Microsoft and others are looking ahead to multimedia-compatible PCs that require IBM VGA-compatible graphics, some are worrying that the hype attending future technology is going to distract the attention of users who have to deal with older systems and deter them from purchasing more pedestrian compact disc/read-only memory offerings. At CD-ROM Expo, most developer attention was devoted to multimedia and other forward-looking technologies with arcane acronyms like DVI, CD-ROM XA and CD-I. Does that mean they're ignoring the need to let the user world catch up or that basic CD-ROM just won't cut it? You tell us. Contact News Editor Pete Bartolik at (800) 343-6474 or message us at COMPUTERWORLD on MCI Mail.

October 8, 1990 (First Issue)

COMPUTERWORLD

The
PREMIER
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NAS. The pe
for an impe

Digital's Network Application Support (NAS) lets you integrate applications and share information across your multivendor environment.

Up to now, the dream of getting all your applications to work together has been just that – a dream. Digital's NAS now makes it a reality.

NAS is a set of software products for using and developing integrated applications running on different vendors' systems. While other computer companies are still wrestling with how to get their own computers to work together, Digital – a company whose computers have always worked together – offers a way to get your applications to work together. Even those running on systems that aren't ours. In fact, NAS works across the widest range of systems in the industry

NAS. How it works.

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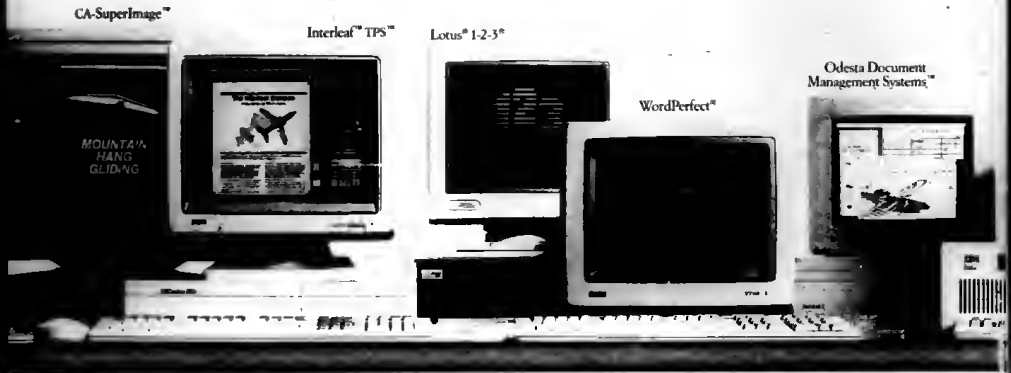
NAS. Why it works.

Achieving integration like this requires just the things Digital is very, very good at. Like networking. And



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For developers, NAS means you can write software once and know it will work on other systems. Savings in time and money can be substantial, allowing you to focus on improving your applications or reducing the backlog.

For users, NAS means you can continue to use the applications you're most comfortable with, but also be able to share information with others much more easily.

For the whole company, NAS means that with more computers working together, more people are working together. That, of course, means more productive workers and the ability to compete more effectively.

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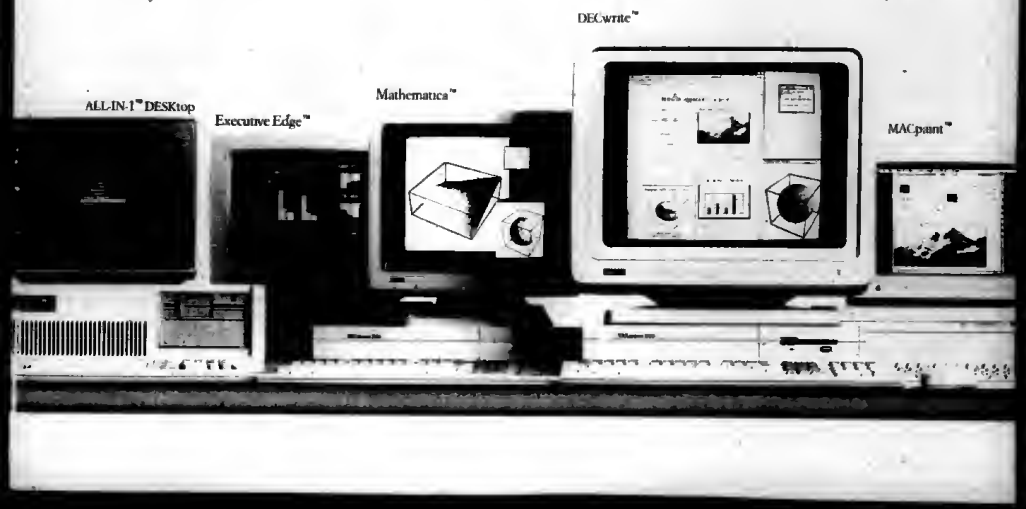

The Problem With Buying Software From A Hardware Company

Once a company gets locked into hardware and software from one computer vendor, it operates at the mercy of that vendor.

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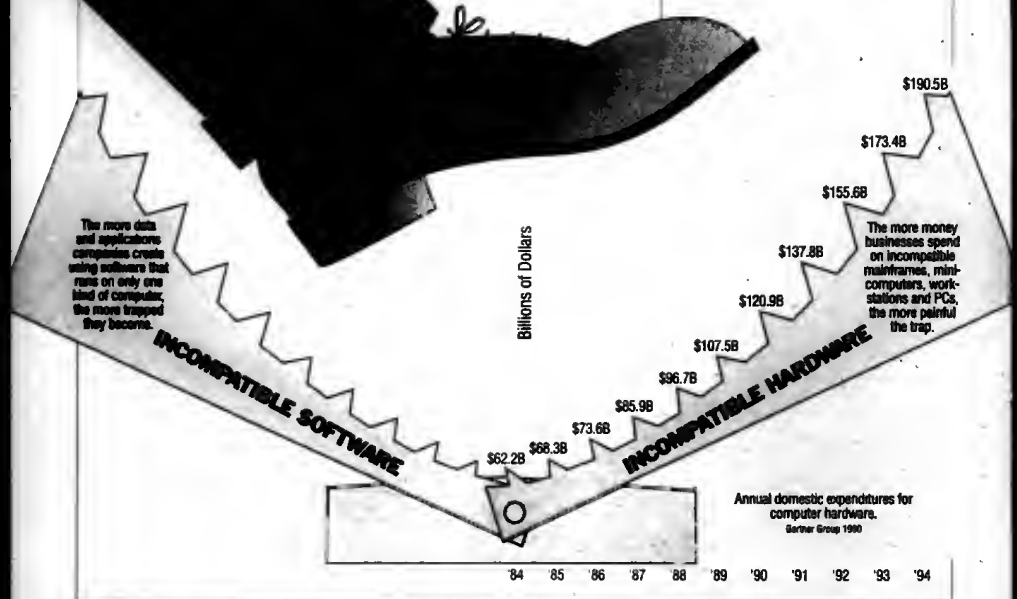

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MORE THAN MONEY

Stephen Sherman

The 1990 Premier 100 Team: *(From left) Joseph Maglitta, Derek Slater, Nancy Kowal, Michael Sullivan-Trainor, Kelly Dwyer and Joyce Chutchian*

Money alone, nearly anyone can tell you, will not buy happiness and friends. Nor success using information technology.

It's true that a company needs to spend money on information technology often just to stay competitive. But to be considered "effective," organizations also need to *make* money over the long haul. That's why the *Computerworld Premier 100* is not simply a roster of big spenders.

Besides being tied to IS spending, our rankings are based on five other carefully selected criteria, including long- and short-term profitability. We also look at the market value of the major systems to determine whether a company is using current technology. Investments in people are as important as investments in hardware, so our ranking also includes percentages of budget for staff and training. Technology access via PCs and terminals is also vital to company effectiveness, so another ratio covers this dimension.

The *Computerworld Premier 100* is actually two lists in one: an overall ranking of IS effectiveness across all industries, and separate rankings of the Top 10 in each industry.

This ranking system is used by companies as a measure of the value of their IS organizations. Each year, we get hundreds of reprint requests from firms wondering how *they* are doing.

More than six months of research and editorial work went into this year's *Computerworld Premier 100* issue. With job hopping at the top levels of IS still common, our staff had to make thousands of calls to track down IS chiefs at 500 corporations. Hundreds of hours of intense analysis went into verifying and calculating the survey data.

We extend congratulations to the winners, appreciation to the participating companies and an invitation to see how America's best put information technology to effective use.

Joseph Maglitta

Michael Sullivan-Trainor

Michael Sullivan-Trainor
Senior Editors

Top IS Users Soar Above Tough Times

BY MICHAEL SULLIVAN-TRAINOR
AND JOSEPH MAGLITTA

Gone are the days when information systems could hide in the back office, sheltered from the turbulent winds of corporate change. As technology plays a greater role in determining company success, information systems professionals are facing the same challenges as their peers in other front-line departments.

Nothing illustrates this shift more clearly than *Computerworld*'s *1990 Premier 100* rankings. Each of the qualifying companies exemplifies the new role of IS.

Now, rather than focusing only on the latest IBM announcement, *Premier 100* executives are grappling with the various challenges of their industries. Financial services firms such as Paine Webber, Inc. are struggling with Wall Street's woes. Defense contractors such as General Dynamics Corp. are anticipating large reductions in their government business. Retailers such as Sears, Roebuck and Co. are battling reduced consumer spending. All the companies on the list are battening down for the looming recession.

However, the biggest factor that causes these companies to rise above various business booby traps is their continued commitment to IS — despite corporate performance dips and anxiety about the future. Not coincidentally, faith in IS corresponds closely to a company's ability to remain profitable despite tough times.

For example, **MCI Communications Corp.** — the only company to rank in the *Premier 100* Top 10 three years in a row — repeats its first-place ranking in 1990 with a 61% increase in profitability from 1988 to 1989 and a 40% increase in its IS budget (from $285 million to $400 million). These achievements are the products of continued victories in the organization's competitive battles with its long-distance service rivals as well as expansion and strategic alliances.

FMC Corp. rockets to second place this year with a $110 million IS budget (an increase of 10%) and significant investments in new equipment. For example, IS spending in the company's agricultural

Illustration by Robert Crawford


100

chemicals group has increased 200% in the past three years. During that time, three plants were upgraded on the industrial chemicals side of the business, along with investments in computer systems for sales and marketing. At the same time, the company's profitability increased 21% from 1988 to 1989. All these events occurred at a time of aggressive competition in the chemicals industry and threatened defense cutbacks, which could affect half the company's business.

American Airlines and its parent, AMR Corp., continue to wing along atop the transportation industry. The company reduced its billion-dollar IS spending by less than 1%, while maintaining its commitment to Sabre and planning a major downscaling of the massive computer reservation system. Profit for AMR was also down 5%, contributing to its slippage in rank to fourth overall.

Other companies continue to be committed to technology despite profit problems — a tribute to the IS executive's ability to support the technology program in difficult weather. **Sears** vaulted to 12th place in 1990 on the strength of a 20% budget increase and profit growth of 3.8%. Yet the $54 billion giant is struggling in 1990, and cost-reduction pressure is mounting. Nevertheless, a strong management commitment to technology continues and may help pull the company back into the limelight.

Bankers Trust New York Corp. is riding a roller-coaster earnings cycle. The volatility of South American loans made it No. 1 in profit growth in 1988 and dealt the company a loss in 1989. However, the bank's commitment to IS remains unswerving. Such support has allowed the company to build a pioneering architecture that supports global operations at a time when other companies are struggling to reach beyond their current systems to support a worldwide market.

INDUSTRY RANKINGS
Average point totals for vertical industries

Industry	Average
Transportation	26,891
Banking	26,465
Utilities	26,452
Chemicals	26,143
Aerospace	26,088
Diversified Services	25,948
Petroleum and Mining	25,913
Industrial and Automotive	25,796
Retail	25,517
Financial Services	25,486
Consumer Products	25,398
Equipment and Materials	25,292
Pharmaceuticals and Food	25,262

Overall, the *Premier 100* Top 10 increased spending by an average of 8%, or 5.4% of their total revenue, down 0.2% from last year's Top 10. Investments in current computer systems increased by an average of 6%, but the ratio to revenue actually decreased by 0.2%. Investments in personnel also decreased by an average of 5%, and training expenditures remained about even. The growth area is personal computers and terminals, which increased by an average of 12%.

As significant as the statistics are, the way that these investments are applied make the difference between *Premier 100* winners and the rest of the pack. One key ingredient to a recipe for IS effectiveness is the ability to carry out a unified vision of where technology integrates with business requirements. For the top companies, this statement is more than motherhood and apple pie: It is the way they do their jobs.

For example, MCI succeeds because its IS investments are intrinsic to the development and growth of its network — the single most important element in the company's arsenal. Savvy marketing and key strategic relationships would falter without a solid systems infrastructure to back them up.

American Airlines is likewise guided by such single-minded vision. Sabre is the focus of the company's attention, and IS is responsible for making it work and making it work well.

A unified sense of where technology should be applied and how to apply it permeates the atmosphere of IS operations at FMC, 3M Co. and Caterpillar, Inc. as well.

As important as insight into systems applications are the tools to carry out the functions. Leading-edge technologies or ways to revitalize old applications are vital to carrying out the promise of IS. All of the top companies employ current technology to get the job done. But some stand out

THIS SEASON, CORPORATIONS WANT A LEAN, MEAN IS MACHINE

Leaner, more supple and closer to the action is how firms want their IS organizations, IS executives say.

Rather than centralize or decentralize, executives report that their organizations are crafting new, hybrid structures combining both forms. In fact, a survey of companies reveals that more than half (56) are now operating "mixed" IS organizations. Another 24 retain centralized structures, while 12 are fully decentralized.

Proponents of mixed structures include the following: FMC Corp., General Dynamics Corp., Abbott Laboratories, ALCOA and Pacific Mutual Life Insurance Co. Centralization is favored by Paine Webber, Inc., The Travelers Corp. and Signet Banking Corp., to name a few. Among the larger decentralized companies are American Express Co., Gencorp, Inc. and United Technologies Corp.

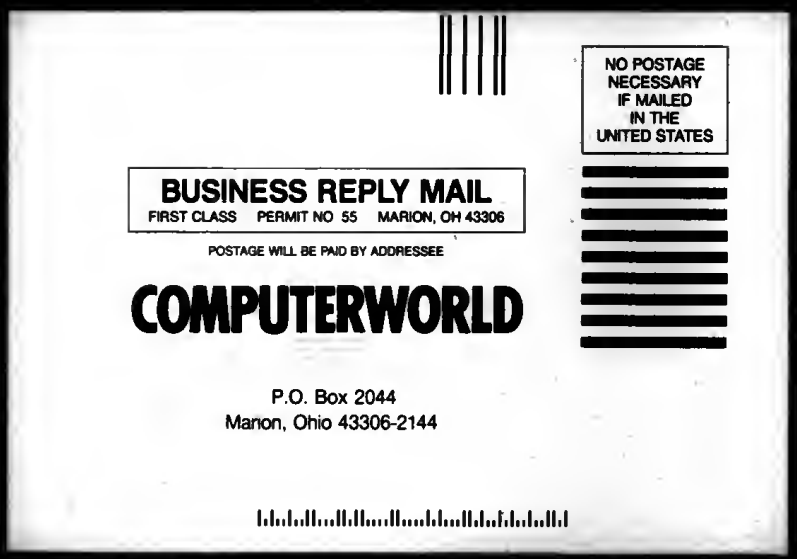
According to IS managers, the new hybrid structures let organizations take advantage of local access to technology while still providing overall guidance for systems efforts from the central organization.

An important related development is the fast-growing popularity of data center consolidation as a cost-cutting measure. All told, 43 of the companies report that they have merged or consolidated data centers over the last year — thanks to better and more efficient technology. Another 27 expect to do so in the coming year.

Typical among consolidators is Edwin Sherin, senior vice-president of IS at Primerica Corp., who reports: "We will continue to implement a data center consolidation effort which will yield significant expense savings."

Amentech reports data center consolidations from 14 to four over a five-year period.

Consolidation is especially popular among aerospace firms, which are also restructuring and downsizing in anticipation of federal defense budget cutbacks.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more than others.

Merck and Co.'s Albert Cinorre, vice-president of computer resources, oversees an IS budget of $185 million. Traditionally a major Wang Laboratories, Inc. shop, Merck has turned to the latest IBM systems to speed drug development, particularly in the area of molecular modeling.

Such investments in the latest systems must be tempered today with a keen awareness of budget contraints. Cost efficiency is a major theme among the most effective users of IS. At **FMC**, for example, no processor is bought before its time. The systems are purchased at the beginning of their cycle below peak costs and are jettisoned before their value expires. But more than that, the latest 3090 or direct-access storage device will not cross the threshold of the organization's computer center without a proven business requirement for the system.

The IS group at **Caterpillar** is also adamant that technology usage match business requirements. This emphasis coincides with a management direction that ties investments to the total business rather than a single task. For example, Caterpillar is engaged in a five-year project called "Plan With a Future" that will revamp the company's 32 facilities worldwide by 1992 through the use of the latest systems.

Other companies emphasize process and integration with the company culture as subtler ways to fashion effective IS organizations. **General Dynamics** focuses on total quality management, where less than 100% quality is unacceptable. Such concentration speeds application development by involving more user participation and embeds the philosophy of doing it right the first time into the organization's culture.

Likewise, 3M is a company that lives by innovating. Its manufacturing process is marked by continual enhancement and reinvention of its products. IS at 3M is the life-support system, making innovation possible through speeding idea development to later process stages and using standards to guarantee uniformity throughout the world.

Last but still key is an emphasis on the people who run the IS operations. Companies such as **Paine Webber** and **Union Texas Petroleum Holdings, Inc.** empower those involved in IS — both users and technical specialists — by giving them control over their work and exposure to both technical and business requirements. In fact, Paine Webber recently fired 71 outside consultants and entrusted their projects to internal staff to cut costs and to show faith in the staff at the same time.

The *Premier 100* also tells the story of companies that, despite strong efforts, find it difficult to keep up with the highfliers in the choppy IS stratosphere. Though they are still effective IS operations, the companies are finding that business circumstances are taking their toll. Among these are **Baxter International, Inc.**, which fell from the lofty position of eighth overall and No. 1 in manufacturing last year to 50th this year because of significant downsizing and restructuring, leading to a $50 million reduction in the IS budget. Michael Heschel, Baxter's well-known IS chief, moved over to head IS at Security Pacific Corp.

Modest increases in spending and profit at **Dow Chemical Co.**, another industry winner last year, caused it to be passed by other fast-rising companies. The company relocated five spots lower on the list, with continued data center consolidations as the major activity.

Lockheed Corp. toppled down on the list because of a large reduction in profit accompanied by changes caused by a restructuring of the aeronautical group, shutting down operations in California and consolidating in Georgia.

Northrop Corp. also fell lower on the list with a 23% budget cut as part of consolidations and streamlining. This cut was accompanied by a large drop in profits.

Other companies, such as **Northeast Utilities**, which captured the top rank overall in 1988, simply failed to keep up with the pack. Modest budget and value increases of less than 2% and personal computer and terminals boosts of less than 10% coupled with a 10% profit drop caused the company to fall further down the list.

All the ups and downs of life at the top of IS evidenced by the *Computerworld Premier 100* show the battle scars of the 1990s. And to think it's only the beginning of the decade. □

HIGHEST TRAINING RATIOS

Percentage of IS budget spent on training

Corporation	Percent
3M Co.	7.2
FMC Corp.	7.0
The Travelers Corp.	7.0
Union Carbide	7.0
MCI Communications Corp.	6.0
Merck and Co.	6.0
Becton, Dickinson and Co.	5.4
Northeast Utilities	5.2
Sears, Roebuck and Co.	5.2

BIGGEST PC USERS

Top 10 PC to employee ratios

Corporation	PCs: employee
The Mutual Life Insurance Co. of New York	1.58 : 1
MCI Communications Corp.	1.55 : 1
US West	1.50 : 1
AMR Corp.	1.29 : 1
Bankamerica Corp.	1.29 : 1
Signet Banking Corp.	1.25 : 1
Louisiana Land and Exploration Co.	1.21 : 1
The Travelers Corp.	1.15 : 1
Oryx Energy Co.	1.10 : 1
Union Texas Petroleum Holding Co.	.95 : 1

SPENDING HIGHS AND LOWS

Largest IS budget

Corporation	1990 IS Budget (millions)	Overall rank
AMR Corp.	1,214	4
Boeing Co.	1,164	49
Sears, Roebuck and Co.	990	12
Ameritech Applied Technology	880	23
American Express Co.*	874	26

Smallest IS budget

Corporation	1990 IS Budget (millions)	Overall rank
Louisiana Land & Exploration Co.*	7	86
The Penn Central Corp.*	15	75
Jostens, Inc.*	16	100
Freeport-McMoran, Inc.	17	70
Union Texas Petroleum Holdings, Inc.	18	5

*Budgets are based on *Computerworld* estimates.

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Survey:

HIGH PRESSURE, HIGH STAKES

BY MICHAEL SULLIVAN-TRAINOR
AND JOSEPH MAGLITTA

More pressure. More money. More business focus. The new reality is unmistakable. Information technology has become a much higher-stakes game.

Top information systems executives say their companies are counting on information technology more than ever to shore up and even expand their businesses. Any doubts about the passing of the sheltered, glass-house days of data processing are dead as an IBM 360. To be in IS today means to be in business. Big business.

That's the clear message from the first-ever poll of *Computerworld Premier 100* firms. The telephone survey was conducted by First Market Research in Boston, between Aug. 27 and Sept. 12. Respondents were 92 top information executives in *Premier 100* companies.

Of course, life in a faster lane has its pluses: Despite a choking national economy, most IS managers say their budgets have *increased* this year. Nearly six in 10 got hikes that averaged a healthy 17.2% for 1990.

"[IS spending] is like a wheel," says William Friel, an executive vice-president at The Prudential Insurance Co. "We are consistently driving down the unit cost of computing, but we are investing more to deliver more applications supporting the business thrust."

Q During the past year, do you believe that the degree of scrutiny by top management and shareholders has increased, decreased or stayed about the same?

A

Increased	70
Stayed the same	21
Decreased	0

Number of respondents (Base: 91)

Only about one in 10 IS budgets took a cut. The average decrease was 15.8%.

The extra cash comes at a price, however. Companies sinking more money into information technology want more payback for their dollar. The result is that IS managers are feeling more top managers breathing down their necks. Nearly three-quarters say they are more closely scrutinized by top management and stockholders than they were a year ago.

"We have had moderate budget increases, but every increase is tied to specific projects that are expected to save the company big bucks," says Alfred Caponiti, director of data and database administration at Bell Atlantic Corp.

This reality, among others, has led three-quarters of the respondents to set up programs to measure the value or effectiveness of information technology. Results, however, have been mixed: More than half rated their program only "somewhat successful."

With more responsibility also comes more worry, executives say. What keeps top IS managers awake at 3 a.m.? Increasingly, it's the same

Q In your opinion, what will be the biggest challenges facing your IS department in the coming year?

A

Top four answers

Improving products and services and keeping costs down	30
Implementing new systems and staying current with technology	25
Integration of systems and data	15
Finding qualified people and developing skills	7

Number of respondents (Base: 92)

issues that keep their business counterparts awake: the need to make profitable, competitive products; handling technological change and integration; worldwide recession; and disenchanted customers.

"Because of the competitiveness within the banking industry, everyone is taking a tighter look at the bottom line," says Bob Sevacko, manager of data center operations at Wells Fargo and Co.

Predictably, most IS executives in every industry say they expect competition to get tougher during the next year.

Many IS executives' worlds are also getting bigger — and fast. Nearly half say their IS organizations expanded abroad or began offering systems support outside the U.S. during the past year. Their confidence level is high; the majority think U.S. companies are more effective users of information technology than Japanese or European firms, especially the latter.

Yet despite a new, strong business focus, IS executives haven't forgotten that their big weapon is still technology. Imaging systems in particular are seen as having the "most critical" value for competitive success during the next five years, followed closely by local-area networks and computer-aided software engineering (CASE) tools. Interestingly, media darlings such as workstations, distributed processing and Integrated Services Digital Network ranked at the bottom of the list.

Faith in technology remains high. A full 98% say that advanced or leading-edge technology is critical or important to their competitive survival. "Local and long-distance telephone services are extremely competitive now," says Derek Bailey, manager of systems and operations at United Telecommunications. "Without the advantage in clarity that our fiber-optic technology gives us, we would not be able to compete."

Q How important is advanced or leading-edge technology to staying competitive in your industry?

A

Critical	24
Very important	47
Somewhat important	20
Not very important	1

Number of respondents (Base: 92)

Indeed, the idea of using information technology to get a leg up on the competition is far from dead. During the last 12 months, two-thirds of the respondents installed an information system with the express purpose of providing competitive advantage.

REDESIGN TREND

Premier 100 companies are not merely throwing dollars at technology, though. Most recognize a clear need to fundamentally change the way they do business. To this end, a whopping four-fifths say they have redesigned or re-engineered a key business process to take advantage of information technology. The trend is expected to continue.

Nearly three-quarters have looked into outsourcing. Half say they will outsource all or part of their operations within the next 12 months.

For example, the refining and marketing branch at Sun Co. has signed a letter of intent to outsource its data operations. "We are getting rid of surplus computing power and building space. The end result is significant savings," says Edward Parrish, director of IS.

In the executives' own companies, sales and marketing are hot spots demanding attention, followed by manufacturing and customer service.

Faced with both technical and business challenges, how do top IS managers plan to survive the next few years? Most executives say good technology planning and integration are key. Also required, they say, is a strong top management buy-in and extra attention to staffing and training.

"The people you hire are extremely important," says Karen French, manager of programming at Ingersoll-Rand Corp. "Without strong commitment from management, we take a few steps backward and become a file server-type operation, instead of an integrated part of bosiness planning."

Q Has your company's IS budget increased, decreased or stayed the same during the past year?

A

Increased	53
Stayed the same	21
Decreased	15

Number of respondents (Base: 89)

Their advice for rising IS stars? Besides learning the business, IS executives say to focus on keeping technically current and acquiring good people skills.

In the long term, some IS executives foresee that the blurring between technology and business will eventually extend deeper into company ranks.

"If you look at the decade ahead — especially the end of the decade — I think it will become very difficult to distinguish the programmer from the business person," says Jim Gottardi, manager of IS at Phillips Petroleum.

"The distinction we see today will blur. CASE technology, for example, may ultimately allow a fairly nontechnical person with limited [or no] knowledge of programming languages to develop a working application," he says. □

Q What is the single biggest challenge now facing your industry?

A

Top four answers

Technological change and integration	21
Providing profitable and competitive products	20
Expense control and low-cost production	10
Worldwide recession and global situation	7

Number of respondents (Base: 92)

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GUIDE TO TABLES

HOW WE RANK THE PREMIER 100

TARGET GROUP
To qualify for Computerworld's Premier 100, a company must be publicly traded, U.S.-based and in the top half of its vertical industry group as listed in the annual "Fortune Industrial 500" or "Fortune Service 500". Only parent companies are ranked; subsidiaries are considered under parent company affiliations. Firms that make the majority of their revenue from the sale of information systems and related products are not included in the ranking.

DATA GATHERING
Premier 100 companies are ranked based on data gathered in an extensive survey that involves mail surveys followed by telephone interviews. Data is collected from the chief information systems executive in the organization. In a limited number of cases where the company does not supply data, Computerworld generates estimates based on market research and other sources. All estimates are confirmed prior to rank calculation.

RANK CALCULATION
Overall scores are based on the sum of point totals of six criteria: 1) IS budget 2) five-year profit average 3) current market value of major processors 4) percentage of budget spent on staff 5) percentage of budget spent on training and 6) ratio of personal computers and terminals to total employees. Each criterion is calculated separately for all firms in the target group. Point totals, which are weighted according to their relative importance, are then combined, yielding a final score.

IS BUDGET
The IS budget is measured as a percentage of total revenue. This levels the field, so that the largest firms, which are able to invest significantly more in IS, do not dominate the ranking.

To account for differences in spending levels between industries, a company's budget/revenue percentage is then compared with the average for IS spending as a percentage of revenue for that company's industry.

For example, a bank's percentage is compared with an industry average spending percentage of more than 4%, while a retailer's percentage is compared with an average percentage of 1%. The firms that achieve the greatest difference between their percentage and the average for their industry receive the most points. This is weighted by a factor of 30.

PROFIT AVERAGE
The ranking employs a rolling, five-year profit average. In the 1990 edition, profits for '85,'86,'87,'88 and '89 were considered. The companies with the largest average growth in profits received the most points, weighted by a factor of 15.

PROCESSOR VALUE
The value of major processors, specifically mainframes and minicomputers, is calculated based on what the systems would be worth if they were sold on the market today. This figure is then divided by total revenue so that large firms do not automatically gain more points. The percentage of value to revenue is weighted by a factor of 15.

STAFF AND TRAINING
Calculations for staff and training are based on amounts for those items compared with the IS budget. Fewer points are given for a larger percentage spent on staff. More points are given for a larger percentage spent on training. Points for staff percentages are weighted by a factor of 10. Training points are weighted by a factor of 15.

PCS AND TERMINALS
The total numbers of PCs and terminals are added together and then divided by the total number of employees to obtain this ratio. Points for the ratio are weighted by a factor of 15.

DEFINITIONS

CHART TYPES
Following this page is the main chart listing data for those companies that qualified for the Top 100 ranking. Each vertical industry section also contains a chart that lists data for the Top 10 companies in specific industries, regardless of whether they qualified for the Top 100.

IS BUDGET
Figures represent 1990 totals for corporatewide capital and operating budgets for information systems and services. Expenditures for staff, hardware, software and data communications are included. Not included are telecommunications costs or spending on information technology by departments other than IS.

1989 PROFIT
Profits used in the ranking are after taxes and after extraordinary credits or charges. Profit for mutual insurance companies is based on net gain from operations, and revenue is based on premium and annuity income plus net investment income.

MARKET VALUE
Figures are totals for the current market value for all major processors, including supercomputers, mainframes and minicomputers. They reflect the dollar value of the systems if they were sold on the market today, regardless of whether the company owns or leases the systems.

OTHER STATISTICS
Training figures include in-house and off-site costs. Staff figures include salary, benefits and travel. The total number of personal computers and terminals include brokerage systems, travel agent systems and retailing systems in all user departments and IS. Revenue for banks includes interest income plus other operating income.

FOOTNOTES
++ on the main chart indicates the following: Bankers Trust — reflects accounting for a loss in Latin American loan reserves; Bell Atlantic — reflects extraordinary charges of $75.7 million for a change in accounting method and $244.8 million for restructuring and other charges; FMC Corp. and Carter Hawley Hale Stores, Inc. — reflects extraordinary charges of at least 10%.

The 100 Most Effective Users of Information Systems

Overall rank	1989 rank	Company IS executive	Industry	Industry rank	Total score	IS budget (millions)
1	1	**MCI Communications Corp.** Allen Ditchfield, Senior VP	utilities	1	28,530	$400
2	—	**FMC Corp.*** Dan W. Irwin, VP	chemicals	1	28,450	$110
3	4	**Bankers Trust New York Corp.** Carmine Vona, Executive VP	banking	1	28,200	$400
4	3	**AMR Corp.** Max D. Hopper, Senior VP	transportation	1	28,100	$1,214
5	19	**Union Texas Petroleum Holdings, Inc.** Richard L. White, Director	petroleum	1	27,905	$18
6	6	**General Dynamics Corp.** Asaph H. Hall, VP	aerospace	1	27,855	$585
7	48	**Paine Webber, Inc.*** Robert McKinney, CIO	financial services	1	27,755	$200
8	15	**Norwest Corp.** Brian Phillips, Executive VP	banking	2	27,710	$133
9	5	**Banc One Corp.** Dave Van Lear, President, Services Corp.	banking	3	27,565	$235
10	13	**Gencorp, Inc.*** Linda George, Director	aerospace	2	27,525	$40
11	44	**The Dun & Bradstreet Corp.** Michael S. Field, President, IS	diversified services	1	27,465	$750
12	—	**Sears, Roebuck and Co.** Charles A. Carlson, President, Technology Services	retailing	1	27,390	$990
13	10	**Gillette Co.*** Herbert W. Moller, VP	consumer products	1	27,375	$112
14	—	**Chicago & North Western Transportation Co.*** Ed Lillig, VP	transportation	2	27,250	$42
15	14	**Signet Banking Corp.** Floyd Griggs, Executive VP	banking	4	27,210	$57
16	93	**Martin Marietta Corp.** Raymond S. Wiltshire, VP	aerospace	3	27,150	$291
17	7	**Security Pacific Corp.** Mike Heschel, Chairman and CEO, Automation Co.	banking	1	27,105	$431
18	—	**United Telecommunications, Inc.*** Art Krause, Executive VP	utilities	2	27,060	$138
19	—	**Corestates Financial Corp.** Robert Gilmore, Executive VP	banking	6	27,055	$71
20	16	**The Dow Chemical Co.** Dave Butler, Director	chemicals	2	27,050	$347
21	2	**GTE Corp.*** Joseph Rasmussen, Director	utilities	3	27,000	$750
22	14	**Bell Atlantic Corp.** Joe Ambrozy, VP	utilities	4	26,930	$709
23	—	**Ameritech Applied Technologies** Henry Kozik, Manager	utilities	5	26,895	$880
24	—	**Allied-Signal, Inc.*** Donald Fleming, Director	aerospace	1	26,880	$372
25	—	**Air Products and Chemicals, Inc.** Peter Mather, VP	chemicals	3	26,685	$46
		Medians for all Premier 100 companies			25,635	$158

* Estimates are from Computerworld sources, not the company. **See footnotes, page 1

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	Total IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees	'89 profit (millions)
6.15%	$226	3.48%	1,700	43%	6%	29,500	1.55 : 1	$529
3.18%	$35	1.01%	NA	37%	7%	7,200	.74 : 1	$136
5.48%	$75	1.03%	1,535	37%	1%	9,000	.65 : 1	$(980)++
11.46%	$97	0.93%	4,000	26%	1%	124,000	1.29 : 1	$455
1.55%	$18	1.55%	96	44%	1%	1,800	.95 : 1	$173
5.02%	$250	2.49%	5,950	42%	2%	28,000	.29 : 1	$293
6.84%	$12	0.41%	NA	49%	2%	10,357	.80 : 1	$139
4.54%	$49	1.67%	890	32%	2%	15,500	.84 : 1	$237
7.34%	$40	1.25%	1,100	30%	5%	14,000	.58 : 1	$363
2%	$15	0.75%	NA	36%	5%	8,700	.58 : 1	$210
17%	$150	3.47%	12,000	45%	3%	50,000	.71 : 1	$586
1.84%	$613	1.14%	6,500	39%	5%	332,350	.75 : 1	$1,509
2.93%	$85	2.23%	NA	50%	5%	8,500	.28 : 1	$285
4.34%	$11	1.09%	NA	39%	2%	4,590	.61 : 1	$(21)
4.18%	$18	1.31%	683	43%	3%	7,107	1.25 : 1	$123
5.02%	$62	1.07%	2,505	35%	2%	20,100	.44 : 1	$307
4.3%	$125	1.25%	6,500	46%	1%	31,000	.75 : 1	$741
1.83%	$75	0.99%	NA	39%	4%	38,636	.93 : 1	$363
5.26%	$17	1.26%	710	43%	1%	10,000	.83 : 1	$240
1.97%	$100	0.57%	1,900	34%	5%	32,000	.52 : 1	$2,486
4.3%	$140	0.8%	NA	37%	5%	90,000	.57 : 1	$1,417
6.19%	$416	3.63%	3,400	34%	4%	66,000	.83 : 1	$1,070++
8.62%	$115	1.13%	4,700	45%	4%	65,000	.86 : 1	$1,238
3.09%	$159	1.32%	NA	47%	3%	33,543	.31 : 1	$528
2.29%	$5	0.24%	368	42%	1%	5,180	.49 : 1	$289
2.71%	$45.5	0.93%	1,800	41%	3%	13,735	.55 : 1	$289

The 100 Most Effective Users of Information Systems

Overall rank	1989 rank	Company IS executive	Industry	Industry rank	Total score	IS budget (millions)
26	25	**American Express Co.** Roy Lowrence, VP, Corporate	financial services	2	26,675	$874
27	30	**US West** Winston Wade, VP	utilities	6	26,645	$263
28	46	**Federal Express Corp.** Ron Ponder, Senior VP	transportation	3	26,625	$234
29	21	**Southwestern Bell Corp.** Donald A. Reeb, Manager	utilities	7	26,610	$294
30	24	**3M Co.** Donald Siegfried, Executive Director	manufacturing	1	26,540	$469
31	33	**Atlantic Richfield Co.** John Coman, Manager	petroleum	2	26,465	$237
32	—	**Oryx Energy Co.** W.M. Fore, Director	petroleum	3	26,455	$27
33	—	**Phillips Petroleum Co.** P.J. Gottardi, Manager	petroleum	4	26,440	$160
34	—	**Pacific Mutual Life Insurance Co.*** William A. Roberts, VP	financial services	3	26,420	$57
35	69	**Caterpillar, Inc.** Dale Fieldcamp, Director	industrial	1	26,405	$300
36	—	**Salomon, Inc.*** John Galante, VP	financial services	4	26,395	$335
27	32	**Monsanto Co.** Leonard A. Cohn, VP	chemicals	4	26,365	$190
38	57	**Merck & Co.** Albert C. Cinorre, VP	pharmaceuticals	1	26,310	$185
39	9	**Contel Corp.*** Chuck Achuff, Acting Director	utilities	8	26,305	$150
40	—	**Bankamerica Corp.** Martin Stein, Executive VP	banking	7	26,300	$497
41	20	**Grumman Corp.** Daniel Larkin, VP	aerospace	5	26,055	$241
42	31	**Polaroid Corp.** Al Hyland, Director	consumer products	2	26,015	$62
43	17	**The Timken Co.*** Neil Siebenher, Director	industrial	2	25,910	$37
44	—	**General Re Corp.*** Steve Raye, VP	financial services	5	25,855	$87
45	39	**Northeast Utilities** Tod O. Dixon, VP	utilities	9	25,835	$73
46	—	**The B.F. Goodrich Co.*** Matthew J. Battista, VP	chemicals	5	25,805	$53
47	—	**Centerior Energy Corp.** Joseph Stricker, Director	utilities	10	25,755	$30
48	58	**The Mead Corp.*** John Langenbahn, VP	manufacturing	2	25,725	$53
49	67	**The Boeing Co.** Donna Mikov, President, Computer Services	aerospace	8	25,715	$1,164
50	8	**Baxter International, Inc.** Bob Kratz, VP	manufacturing	3	25,645	$200

* Estimates are from *Computerworld* sources, not the company.

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	Total IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees	'89 profit (millions)
3.49%	$436	1.74%	7,000	23%	5%	70,000	.67 : 1	$1,157
2.71%	$288	2.97%	4,500	52%	5%	105,000	1.50 : 1	$1,111
3.34%	$74	1.06%	2,008	46%	2%	30,000	.34 : 1	$413
3.36%	$257	2.94%	2,900	54%	1%	61,700	.93 : 1	$1,093
3.72%	$167	1.33%	2,726	48%	7%	42,200	.49 : 1	$1,310
1.41%	$40	0.24%	1,500	50%	2%	15,000	.55 : 1	$1,953
2.23%	$16	1.33%	122	33%	3%	3,200	1.10 : 1	$124
1.28%	$35	0.28%	1,182	45%	3%	13,470	.60 : 1	$219
2.88%	$19	0.96%	NA	47%	2%	1,900	.55 : 1	$28
2.7%	$200	1.8%	2,500	40%	5%	25,000	.41 : 1	$497
3.72%	$33	0.37%	NA	26%	1%	6,105	.69 : 1	$470
2.19%	$142	1.63%	1,200	38%	4%	15,000	.36 : 1	$679
2.8%	$110	1.67%	1,000	50%	6%	11,000	.32 : 1	$1,500
4.81%	$25	0.8%	NA	38%	5%	5,000	.23 : 1	$287
4.36%	$132	1.16%	5,000	52%	2%	73,000	1.29 : 1	$1,103
6.69%	$69	1.92%	2,100	44%	3%	16,200	.58 : 1	$67
3.27%	$35	1.84%	475	40%	2%	5,000	.45 : 1	$145
2.41%	$19	1.24%	NA	35%	5%	5,110	.30 : 1	$55
3.14%	$11	0.38%	NA	43%	4%	1,920	.81 : 1	$599
3.3%	$117	5.3%	456	38%	5%	5,033	.60 : 1	$203
2.11%	$8	0.32%	NA	42%	4%	4,959	.42 : 1	$172
1.29%	$22	0.95%	276	40%	1%	4,952	.55 : 1	$277
1.14%	$25	0.54%	NA	61%	5%	18,273	.84 : 1	$216
5.74%	$160	0.79%	8,788	53%	2%	91,964	.56 : 1	$675
2.7%	$65	0.88%	1,100	30%	1%	25,000	.42 : 1	$446

The 100 Most Effective Users of Information Systems

Overall rank	1989 rank	Company IS executive	Industry	Industry rank	Total score	IS budget (millions)
61	12	**Northrop Corp.** W Richard Howard, VP	aerospace	7	25,625	$290
52	—	**Rohm & Haas Co.*** William H. Groetzinger, Director	chemicals	8	25,620	$53
53	—	**Massachusetts Mutual Life Insurance Co.** Susan Magee, Senior VP	financial services	6	25,615	$75
54	—	**New York Life Insurance Co.** Thomas Pettibone, Senior VP	financial services	7	25,600	$156
55	—	**CSX Corp.** Jack Cooper, President, CSX Technology	transportation	4	25,590	$220
56	—	**Wells Fargo & Co.*** Elizabeth Evans, Director	banking	8	25,575	$206
57	—	**The Prudential Insurance Co. of America** William D. Friel, Executive VP	financial services	8	25,550	$818
58	—	**Primerica Corp.** Ed Sherin, Senior VP	financial services	9	25,480	$183
59	34	**United Technologies Corp.** John Hammit, VP	aerospace	8	25,475	$847
60	—	**The Pittston Co.*** Leon Selfe, Manager	industrial	3	25,470	$66
61	56	**Ingersoll-Rand Co.** George Tabbock, Manager	industrial	4	25,400	$80
62	—	**Union Carbide Corp.** Ted Smith, Manager	chemicals	7	25,380	$700
63	—	**Metropolitan Life Insurance Co.** Daniel Cavanaugh, Senior VP	financial services	10	25,320	$433
64	—	**TRW, Inc.*** Don Logan, VP	manufacturing	4	25,315	$85
65	29	**McDonnell Douglas Corp.** Ernie Ridenhour, VP	aerospace	9	25,310	$755
66	28	**Textron, Inc.** Cecil Labhart, VP	aerospace	10	25,285	$252
67	—	**Quantum Chemical Corp.*** John Stooky, VP	chemicals	8	25,245	$69
68	60	**Mobil Corp.** Peter VanZyl, General Manager	petroleum	5	25,180	$740
69	42	**Rockwell International Corp.** J.F. Sutter, VP	aerospace	11	25,170	$492
70	77	**Freeport-McMoran, Inc.** Ron Landry, Director	petroleum	6	25,150	$17
71	—	**The Travelers Corp.** Lawrence A. Bacon, Senior VP	financial services	11	25,140	$342
72	36	**McGraw-Hill, Inc.*** John Dobias, Senior VP	consumer products	3	25,135	$132
73	—	**Amax, Inc.** Joseph Rosio, Director	manufacturing	5	25,055	$30
74	23	**AT&T*** W.F. Osl, VP	utilities	11	25,040	$637
75	—	**The Penn Central Corp.*** John McDonald, Manager	manufacturing	6	25,035	$15

* Estimates are from company-wide sources, not the company

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	Total IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees	'89 profit (millions)
5.53%	$125	2.38%	2,600	45%	5%	22,500	.59 : 1	$(81)
2%	$31	1.16%	NA	47%	2%	12,063	.92 : 1	$176
1.5%	$19	0.38%	935	61%	2%	6,000	.60 : 1	$124
1.02%	$131	0.86%	1,100	35%	2%	10,000	.55 : 1	$1,452
4.15%	$81	1.53%	1,003	39%	05%	12,328	.31 : 1	$770
3.65%	$30	0.53%	NA	43%	3%	16,663	.85 : 1	$601
1.9%	$125	0.29%	6,425	47%	1%	65,200	.65 : 1	$743
3.22%	$24	0.42%	1,015	42%	3%	15,625	.65 : 1	$289
4.28%	$92	0.47%	4,260	46%	1%	35,918	.19 : 1	$701
4.04%	$11	0.65%	NA	39%	2%	4,914	.34 : 1	$4
2.32%	$30	0.87%	800	35%	1%	18,000	.57 : 1	$210
8.01%	$64	0.73%	500	35%	7%	5,000	.11 : 1	$1,269
1.92%	$41	0.18%	2,840	34%	2%	35,882	.72 : 1	$300
1.15%	$70	0.94%	NA	40%	5%	40,607	.35 : 1	$263
5.17%	$245	1.68%	5,600	47%	3%	70,000	.55 : 1	$219
3.39%	$61	0.82%	1,800	40%	1%	24,000	.44 : 1	$259
2.62%	$21	0.8%	NA	42%	4%	5,538	.55 : 1	$247
1.32%	$180	0.32%	3,800	34%	2%	40,000	.59 : 1	$1,800
3.94%	$180	1.44%	2,867	32%	4%	45,000	.41 : 1	$735
0.86%	$10	0.51%	115	25%	4%	1,000	.27 : 1	$150
1.8%	$114	0.6%	3,230	39%	7%	40,285	1.15 : 1	$455
7.38%	$75	4.19%	NA	41%	3%	6,824	.47 : 1	$48
0.77%	$8	0.19%	275	40%	1%	10,000	.50 : 1	$360
1.75%	$400	1.1%	NA	37%	5%	94,555	.33 : 1	$2,697
0.82%	$10	0.55%	NA	43%	3%	6,538	.43 : 1	$174

The 100 Most Effective Users of Information Systems

Overall rank	1989 rank	Company IS executive	Industry	Industry rank	Total score	IS budget (millions)
76	68	**J.P. Morgan & Co., Inc.** Ralph Mastrangelo, Senior VP	banking	9	25,030	$382
77	18	**Lockheed Corp.** Dean Allen, VP	aerospace	12	25,005	$425
78	—	**Sun Co.** Edward Parrish, Director	petroleum	7	24,980	$80
79	22	**Abbott Laboratories** Kenneth Farmer, VP	pharmaceuticals	2	24,975	$145
80	—	**Ambase Corp.*** Anthony Graffeo, Senior VP	financial services	12	24,965	$94
81	81	**National City Corp.*** Harold B. Todd, Executive VP	banking	10	24,935	$104
82	94	**Duke Power Co.** George Stubbins, VP	utilities	12	24,820	$72
83	54	**Becton, Dickinson & Co.** Hank Wilkin, Director	manufacturing	7	24,785	$46
84	—	**Mutual Benefit Life Insurance Co.*** Charles McCaig, Senior VP	financial services	13	24,765	$48
85	—	**Xerox Corp.** Patricia C. Barron, VP	manufacturing	9	24,740	$400
86	—	**Louisiana Land & Exploration Co.*** Nick Wood, Director	petroleum	8	24,735	$7
87	—	**Carter Hawley Hale Stores, Inc.*** Paul Burraws, VP	retailing	9	24,725	$42
88	—	**Colgate-Palmolive Co.*** Bruce Johnson, VP	consumer products	4	24,715	$77
89	—	**Aluminum Co. of America*** W.G. Nichols, Director	manufacturing	9	24,705	$104
90	—	**Valhi, Inc.*** Michael A. Snetzer, President	chemicals	9	24,685	$47
91	—	**Inland Steel Industries, Inc.** H. William Howard, VP	manufacturing	10	24,655	$70
92	—	**Eli Lilly and Co.*** Lee Gery, Director	pharmaceuticals	3	24,505	$39
93	—	**Merrill Lynch & Co.** DuWayne Peterson, Executive VP	financial services	14	24,475	$800
94	—	**The Mutual Life Insurance Co. of New York*** Gordon Duff, VP	financial services	15	24,470	$100
95	55	**J.C. Penney Co.** Dave Evans, VP	retailing	3	24,435	$201
96	—	**Enron Corp.*** Alberto Gude, VP	petroleum	9	24,430	$121
97	71	**Shawmut National Corp.*** Jay Ryston, Senior VP	banking	11	24,425	$136
98	47	**Northwestern Mutual Life Insurance Co.** Edward A. Flitz, VP	financial services	16	24,420	$52
99	—	**The Aetna Life & Casualty Co.*** John O. Loewenberg, Senior VP	financial services	17	24,375	$500
100	—	**Jostens, Inc.*** Jack Yarbrough, Corporate Director	consumer products	5	24,365	$16

* Examinees are from *Computerworld* sources, not the company.

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	Total IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees	'89 profit (millions)
3.49%	$60	0.55%	1,800	47%	1%	11,500	.82 : 1	$725
4.3%	$225	2.27%	3,500	40%	5%	41,000	.50 : 1	$2
1.04%	$7	0.09%	425	45%	08%	5,600	.34 : 1	$85
2.69%	$60	1.11%	1,450	52%	1%	15,000	.35 : 1	$860
2.67%	$32	0.91%	NA	43%	4%	6,644	.71 : 1	$96
4.08%	$34	1.33%	NA	36%	5%	6,418	.44 : 1	$263
1.98%	$42	1.15%	750	35%	4%	10,400	.54 : 1	$520
2.56%	$22	1.21%	487	54%	5%	7,381	.39 : 1	$169
1.25%	$7	0.19%	NA	41%	3%	4,285	.92 : 1	$44
2.27%	$200	1.2%	3,000	37%	1%	43,000	.43 : 1	$704
0.98%	$5	0.67%	NA	38%	3%	846	1.21 : 1	$44
1.51%	$20	0.72%	NA	36%	5%	13,394	.36 : 1	$14
1.5%	$24	0.47%	NA	44%	2%	5,950	.25 : 1	$280
0.93%	$32	0.29%	NA	43%	3%	16,617	.27 : 1	$945
1.97%	$24	1.01%	NA	42%	4%	2,051	.12 : 1	$103
1.69%	$11	0.27%	420	30%	1%	5,400	.27 : 1	$241
0.93%	$16	0.38%	NA	45%	5%	24,995	.89 : 1	$940
7.06%	$100	0.88%	3,500	40%	3%	17,000	.41 : 1	$(213)
2.61%	$32	0.84%	NA	47%	2%	7,025	1.58 : 1	$12
1.23%	$125	0.76%	1,824	38%	1%	89,000	.45 : 1	$802
1.23%	$31	0.31%	NA	39%	4%	3,468	.55 : 1	$226
6.01%	$15	0.66%	NA	42%	4%	11,302	.88 : 1	$(129)
0.82%	$15	0.24%	464	64%	1%	6,194	.60 : 1	$372
2.54%	$93	0.47%	NA	38%	2%	25,000	.56 : 1	$300
2.3%	$2	0.27%	NA	41%	1%	1,000	.12 : 1	$54

MCI: Making the Most of a Delivery Network

Katherine Lambert

MCI's Ditchfield *successfully juggles business and technological concerns*

BY AMY BERNSTEIN

When you ask MCI Communications Corp.'s technology guru Allan Ditchfield when he thinks the company will overtake archrival AT&T, he doesn't laugh, he ponders. Then he replies: "Our compounded growth rate is about 20% a year. Just draw the curve."

He's only half-kidding. If MCI is due for a large dose of humility, the company is not likely to have to swallow hard anytime soon. MCI's hubris is justified so far by its dazzling performance. The company is among the best in the world when it comes to applying technology to solve customer problems, build strategic alliances and seize market opportunities.

MCI wins not only the No. 1 spot in its industry in the *Computerworld Premier 100* for the second consecutive year, but it also ranks No. 1 in the overall survey.

To fully appreciate precisely what MCI does so well, you should first know how well the nation's second largest long-distance telephone company is doing.

Consider these figures: Revenue for 1990 will reach $7.9 billion, a 21% jump over 1989, capping four steady years of growth in earnings and profitability. Operating margins lead the industry at approximately 16% vs. AT&T's 12% to 13%. Average revenue per employee ($355,000) is the highest in the industry. Return on equity leads the industry at 32%. And billable calls increased 40% in 1989.

What statistics cannot convey is how MCI achieves this level of performance year after year in the highly competitive $55 billion long-distance telephone and communications business.

The company views its network as a delivery system for the transaction services and applications that customers demand. The network is not just a highway for applications to ride along but also a platform MCI uses to develop and deliver customized services.

In this context, no single service — neither the highly touted Portfolio electronic billing system nor the Vision package being offered to small businesses — is the star of the MCI show. The real star is the company's ability to deploy computer power where and when it is needed to meet specific customer demands faster than anyone else.

"We understand how important it is to make our infrastructure flexible enough to move from market to market," says Ditchfield, senior vice-president responsible for companywide engineering and information systems operations.

Indeed, according to The Yankee Group, a Boston-based industry research firm, MCI may have the largest mainframe-based distributed process-

ing network of all the long-distance companies.

Of the $1.2 billion that MCI will invest in network enhancements in 1990, much will be spent on improving and expanding the hardware and software platforms designed to deliver real-time services to customers.

Ditchfield is the architect of MCI's transaction processing strategy, which he calls "process integration." With process integration, the network is the integrated delivery mechanism for all customer services, from customized billing to customer-controlled maintenance.

"If you've got the right funnel to implement the right customer ideas," Ditchfield says, "then and only then are you free to create services that ultimately lead to increased revenue and market share."

Process integration also leads to significant operating economies. For example, at MCI's North Royalton, Ohio, integrated network control and data center, the ability to switch intelligent network and IBM 3090 mainframe platforms together — rather than plan, build and run switch facilities and data centers separately — requires two-thirds fewer staff.

In essence, "we've collapsed functions and groups so that MIS and engineering are together, thereby reducing double-planning and double-billing," says James Zucco, MCI's vice-president of product development.

"We'll see MCI move increasingly from offering commodity transmission services to high-value transactions that customers can utilize on a usage-sensitive basis," says Berge Ayvazian, a vice-president at The Yankee Group. K Mart Corp., the nation's second largest retailer, is one customer benefiting from this custom-tailored approach. K Mart uses MCI's Vnet (a large private network) to link 3,400 K Mart and Waldenbook, Inc. stores, distribution centers and offices across the country.

Naturally, there has to be a cloud or two in MCI's silver lining. Ironically, because the company has focused on developing its IS capabilities over the past few years, MCI has not kept pace with the all-digital revolution. Thus, MCI is the only leading long-distance carrier to invest as much as $1.1 billion this coming year to transform its telephone network, resulting in a third-quarter writedown of about $500 million.

What makes MCI IS so effective?

- Network is used to develop and deliver customer services.
- Technology acquisition through mergers.
- Strong use of strategic partners such as Visa.
- IS closely allied with network engineering.

While its relationships with other companies will help minimize the time and investment required for the conversion, it is likely that some of MCI's creative energies will be siphoned off into this effort.

Ironically, MCI could find itself the victim of success. As the company becomes more aggressive in the transaction processing arena, it may have trouble linking up with strategic partners to leverage its capabilities.

Accordiog to Ayvazian, companies such as J.C. Penney Co., which operates substantial credit-clearing networks, will begin asking, "Is MCI my carrier or my competitor?" MCI will be forced to draw clear strategic boundaries separating its networked transaction processing from others. □

BERNSTEIN HEADS GAVROCHE ASSOCIATES, A COMMUNICATIONS CONSULTING FIRM IN BALTIMORE.

Utilities

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**MCI Communications Corp.** Washington, D.C. 19,000	1	28,530	$529	$400	29,500
2	**United Telecom, Inc.*** Kansas City, MO 41,359	18	27,060	$363	$138	38,636
3	**GTE Corp.*** Stamford, CT 158,500	21	27,000	$1,417	$750	90,000
4	**Bell Atlantic Corp.** Philadelphia, PA 79,100	22	26,930	$1,070	$709	66,000
5	**Ameritech Applied Technologies** Chicago, IL 75,900	23	26,895	$1,238	$800	65,000
6	**US West, Inc.** Englewood, CO 70,200	27	26,645	$1,111	$263	105,000
7	**Southwestern Bell Corp.** St. Louis, MO 66,200	29	26,610	$1,093	$294	61,700
8	**Contel Corp.*** Atlanta, GA 21,800	39	26,305	$287	$150	5,000
9	**Northeast Utilities** Hartford, CT 8,400	45	25,835	$203	$73	5,033
10	**Centerior Energy Corp.** Cleveland, OH 9,000	47	25,755	$277	$30	4,952
	Medians for industry Top 10	25	26,770	$800	$279	50,168

Companies are ranked in industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company.

FMC Mixes Crisp Efficiency With Latest Technology

BY MICHAEL SULLIVAN-TRAINOR

David Joel

FMC's Irwin *keeps an eye on technological advances and bottom lines*

Even though his company has extensive business in the Middle East, FMC Corp. Vice-President Dan W. Irwin has more pressing concerns than Iraq's invasion of Kuwait.

As vice-president of technology, manufacturing and information services, Irwin is charged with ensuring that FMC's IS operations are run as cost effectively as possible while still taking advantage of the latest technology when it fits company needs.

The combination of an aggressive technology evaluation strategy and the cost efficiency policy is paying off for the $3.4 billion company, which ranks second in the *Computerworld Premier 100* and is No. 1 in the chemical industry. A diversified company, FMC is a market leader in segments of the chemical, defense and gold-mining industries.

The company's recent investments in technology, combined with an ability to get the most out of its information systems for solid business performance, caused FMC to skyrocket nearly to the top of the 1990 list.

For example, IS spending in the Agricultural Chemicals Group has increased 200% over the past three years, according to John Lowry, manager of the group's information resources. In addition, three plants were upgraded on the industrial chemicals side of the business, along with investments in computer systems for sales and marketing.

"Things are very strong for the company," says J. Jeffrey Cianci, an analyst at Bear Stearns & Co. in New York. "Their earnings are growing each year despite a slowdown in business. They have solid management."

FMC's capital spending in the industrial chemical business is expected to show dividends this year, he adds, and the Middle East conflict will bolster the company's defense business despite future U.S. spending cuts.

"Their spending is heavier than competitors in chemicals, but they have a strong cash flow so they don't have to borrow to expand," Cianci says.

The availability of funds to invest in plants and technology does not mean that FMC is willing to throw its money around, however. This is particularly true in Irwin's IS op-

eration. "We look very closely at the value of our applications and assess the alternatives. We reduce everything we can to some kind of number," he says.

The key to FMC's IS strategy is flexibility at the corporate level, combined with a culture that emphasizes efficiency foremost. "We will do our computing operations only where it makes the most sense, and that is driven by the nature of the application," Irwin says. "In addition, we strive for very high levels of service at the best cost you can get."

As a practical matter, the emphasis on service weighs more heavily in the use of hardware than software. While the company has an aggressive leading-edge strategy — moving to state-of-the-art equipment when it makes sense for the company — no system is allowed to waste processing cycles for the sake of staying current.

For example, at the company's Dallas data center, which does the majority of processing for five business units, including the chemical operations, the unit cost of CPU use has decreased 50% since 1986, while use itself has increased 300%. These efficiencies are made possible by investments in the latest IBM mainframes.

NEW APPLICATIONS RESEARCH

On the software side, the company is pursuing a different type of advanced strategy. With computer-aided design and manufacturing devices a key element in chemical modeling and defense equipment design, FMC is running engineering applications at the National Center for Supercomputing Applications in Champagne-Urbana, Ill. The research is designed to determine how to make supercomputers more effective in supporting three-dimensional computer-aided image modeling.

While laying down ground rules such as cost efficiency, FMC's corporate IS group tries to remain open to the diverse needs of IS groups in the various business units. "Each unit has its own style that is influenced by the management. You'll find a different flavor of ice cream in Philadelphia [where the chemical operations are located] than here. The units have a great deal of autonomy, and we try and develop consultative relationships between our corporate staff and the line organization," Irwin says.

What makes FMC IS so effective?

- Rigorous cost-effectiveness measures.
- Aggressive investments in efficient technology.
- Flexible standards dictated by corporate IS.
- Understanding of the diversified nature of business.

Customer information is currently the focus of investments in Lowry's group. The IS staff there is upgrading its front-end customer applications from a batch system to a relational database using Oracle Systems Corp.'s Oracle on a Digital Equipment Corp. VAX platform. The project, which is being conducted by the Dallas data center, is unusual in a primarily IBM environment, but it is the solution that best suits the unit's needs. It is also one of the first on-line applications to use DEC's XI packet-switched network over a Systems Network Architecture backbone.

Ground-breaking projects are not unusual at FMC, where the industrial chemical division operates a state-of-the-art order-entry and inventory system that provides automatic freight rating of chemical products. "It's the Cadillac of the industry," Lowry says.

SULLIVAN-TRAINOR IS A COMPUTERWORLD SENIOR EDITOR, FEATURES.

Chemicals

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**FMC Corp.*** Chicago, IL 24,110	2	28,450	$136	$110	7,200
2	**The Dow Chemical Co.** Midland, MI 62,100	20	27,050	$2,486	$347	32,000
3	**Air Products & Chemicals, Inc.** Allentown, PA 10,500	25	26,685	$289	$46	5,180
4	**Monsanto Co.** St. Louis, MO 42,179	37	26,365	$679	$190	15,000
5	**The B.F. Goodrich Co.*** Akron, OH 11,892	46	25,805	$172	$53	4,959
6	**Rohm & Haas Co.*** Philadelphia, PA 13,132	52	25,620	$176	$53	12,063
7	**Union Carbide Corp.** Danbury, CT 45,987	62	25,380	$1,269	$700	5,000
8	**Quantum Chemical Corp.*** New York, NY 10,000	67	25,245	$247	$69	5,538
9	**Valhi, Inc.*** Dallas, TX 16,500	90	24,685	$103	$47	2,051
10	**Du Pont Co.*** Wilmington, DE 145,787	117	23,930	$2,480	$1,050	36,909
	Medians for industry Top 10	49	25,713	$268	$90	6,369

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company.

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TEXAS INSTRUMENTS

Bankers Trust Architects a Global Plan

Flexibility lets IS react to both markets and technology

BY SALLY CUSACK

While many information systems organizations are only now awakening to the need to see their companies as worldwide operations, Bankers Trust Co. began its preparations for a global IS support system five years ago.

In 1985, Carmine Vona, executive vice-president and chief technologist at the firm, devised a flexible technology architecture that would support long-term global business needs. The strategy calls for regenerating the architecture itself as the market changes and technology progresses.

Joyce Ravid

Bankers Trust's *Mathai seeks continuous, evolutionary changes in systems architecture*

Today, Vona's vision has paid handsome dividends: Bankers Trust has built a worldwide systems infrastructure that permits real-time operation around the globe from branches in the U.S., Europe and the Far East.

Getting a global head start has helped Bankers Trust become one of the most effective users of information systems and No. 1 among banks listed in the *Computerworld Premier 100* for the second consecutive year. Bank officials say that vision is definitely long-term.

"The entire thrust of the architecture is evolutionary," explains Anish Mathai, a Bankers Trust vice-president and technical architect. "There never will be a finished product. It will grow as computer technology grows."

For example, the firm recently installed 250 Digital Equipment Corp. Vaxstations in its offices in London to access trading floor applications. The systems access an Ultrix-based equity system also used by its Tokyo operation.

Founded in 1903 as a trust company and becoming a commercial bank in 1917, Bankers Trust sold its retail banking network in the early 1980s to redirect its resources toward wholesale banking. The forces behind that change, then-Chairman Alfred Brittain III and future Chairman Charles S. Sanford Jr., devoutly believed that restructuring was the way to remain competitive in the industry. The company abandoned its traditional management hierarchy to embrace a philosophy of integration and cooperation within a horizontal framework.

Currently focusing its businesses on major corporations, financial institutions, governments and select individuals, the bank is organized into two principal units; Financial Services, which incorporates the lending, intermediary, advisory and trading capabilities of the firm, and Profitco, comprised of the bank's trust, investment management, securities processing, cash management and private banking businesses. Corporate debt underwriting power is exercised by an affiliate, BT Securities Corp.

The success of Bankers Trust merchant banking strategy has been demonstrated by the bank's strong earnings performance. Net income increased from $114 million in 1979 to $620 million in 1989. The figures, which exclude special provisions for South American loan losses in 1987 and 1989, reveal that BT is one of the most profitable major banks in the U.S. based on return equity in excess of 16% for each of the last 10 years.

With the sale of the bank's retail branch network, the company now operates three private banking centers in New York; Miami; West Palm Beach, Fla.; Chicago; Los Angeles; and San Francisco. The bank also maintains representative offices and subsidiaries in major offices throughout the U.S. and has an international network of branches, representative offices and subsidiaries

Continued on page 34

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Continued from page 31

in more than 35 countries.

To accommodate the bank's structural changes and prepare for long-term needs, Bankers Trust's IS organization initiated Vona's architecture project. At the time, a handful of skeptics at the firm opposed the plan because they feared that an architectural approach would become a money pit.

Today, Vona can say "I told you so" to his critics. In fact, Vona says, instead of costing money, the right IS architecture, properly implemented, actually saves money. As proof, he points out that the bank spends far less on IS than some of its major competitors while achieving much larger gains.

The architecture's foundation is rooted in a strong central management structure — almost paradoxical, given the company's pioneering efforts in decentralization.

What makes Bankers Trust IS so effective?

- **Well-defined business and IS strategy.**
- **Freedom in software applications development.**
- **Flexibility to implement new technologies.**
- **Tightly controlled buying process.**

A decentralization pioneer, Bankers Trust is organized into more than 20 decentralized, self-managed business units, each with its own IS support center. Despite this independence, a strong, centralized IS group also remains. Senior IS executives are known as "information architects."

Each division is part of an individual technology center, which must use IBM or DEC hardware and operating systems while adhering to the CCITT X.25 protocol for communications standards. However, maintaining uniformity is not always easy.

Mathai explains, "Sometimes we have to sacrifice local advantages for global advantages ... and corporate strategy. This can be a major hurdle. It's an ongoing process, and local people always want to be the one exception."

Software is a different story. Although the central IS group has full veto power over every project and purchase, the group rarely intervenes in applications decisions. For example, a new equity application — the first using Ultrix — was developed entirely in-house to meet the requirements of the division.

Banking

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Bankers Trust N.Y. Corp.** New York, NY 13,800	3	28,200	($980)	$400	9,000
2	**Norwest Corp.** Minneapolis, MN 18,485	8	27,710	$237	$133	15,500
3	**Banc One Corp.** Columbus, OH 24,000	9	27,565	$363	$235	14,000
4	**Signet Banking Corp.** Richmond, VA 5,700	15	27,210	$123	$57	7,107
5	**Security Pacific Corp.** Los Angeles, CA 41,100	17	27,105	$741	$431	31,000
6	**Corestates Financial Corp.** Philadelphia, PA 12,000	19	27,055	$240	$71	10,000
7	**Bankamerica Corp.** San Francisco, CA 56,420	40	26,300	$1,103	$497	73,000
8	**Wells Fargo & Co.*** San Francisco, CA 19,600	56	25,575	$601	$206	16,663
9	**J.P. Morgan & Co.** New York, NY 14,000	76	25,030	$725	$382	11,500
10	**National City Corp.*** Cleveland, OH 14,600	81	24,935	$263	$104	6,418
	Medians for Industry Top 10	18	27,080	$313	$221	12,750

Companies are ranked by industry according to CW 100 Index

*Estimates are from *Computerworld* sources, not the company

EVER CHANGING WORLD

While bankers trust got a head start in globalization, it knows the world is not standing still. Looking ahead, Vona sees work on the horizon. One possibility is for a universal stock market in 10 or 15 years, above and beyond the foreign exchange.

Fortunately, he says, the bank's evolutionary architecture will let the company take advantage of new markets and technologies as they become available. This will let the bank keep pace with the world's financial direction by building systems that track risks and operate across all markets.

The goal? "Optimize technology as it appears," Vona says. As an example, he says he foresees that by 1995, desktop devices will provide "phenomenal" computing power. "We must be ready to integrate applications, discipline and tasks into these tools."

Vona predicts that employees will soon have the capacity to double and even triple their productivity. To that end, the architecture at Bankers Trust will evolve to develop software and infrastructures that bring technology "to their fingertips and keep us at the forefront of the industry."

Meanwhile, current events continue to test the strength of Bankers Trust's IS capabilities. For example, the August blackout that shut down numerous systems in Manhattan did not hurt Bankers Trust. "We experienced no problems, not even a split second. We are one of a very few that can say that," Vona says. □

CUSACK IS A COMPUTERWORLD STAFF WRITER

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AMR Hones Sabre to Sharpen Competitive Edge

BY CONNIE WINKLER

After creating what is perhaps the most successful strategic information system to provide a true competitive advantage, AMR Corp. is breaking the mold.

The company is doing the unthinkable — carving up its near-legendary innovation, the Sabre computerized reservation system (CRS).

By gradually breaking off chunks of computing from the monstrous mainframe-based Sabre system, AMR — parent of American Airlines — is hoping to reap further advantages from its strategic applications. "We're trying to get ourselves prepared to take advantage of new technologies, which may represent better opportunities," says Thomas J. Kiernan, president of AMR's Sabre Computer Services Division at the Dallas/Fort Worth airport.

Indeed, Max Hopper, AMR's IS superstar, placed an article called "Rattling Sabre — New Ways to Compete on Information" in the May/June 1990 issue of the *Harvard Business Review* proclaiming Sabre's renovation. "While it is more dangerous than ever to ignore the power of information technology, it is more dangerous still to believe that, on its own, an information system can provide an enduring business advantage," Hopper wrote. "The old models no longer apply."

How well the new strategy will work for American Airlines remains to be seen. The back-to-technology push for AMR comes at a time when the airline and industry is caught between a rock and a hard place, as some analysts describe it.

AMR, along with all domestic airlines, faces crazy fuel prices, declining passenger loads and squeezed profits. And AMR, considered one of the strongest in the airline group, recently had its debt rating downgraded by Standard & Poor's Corp.

"The kind of business environment we are in is when Sabre and computerized reservation systems really earn what's put into them," says Edward J. Starkman, who follows the airline industry for Paine Webber, Inc. in New York. "When pricing is difficult and passenger loads are soft, you squeeze everything you can [from the CRS]."

The catch-22 to the new strategy, however, is that it's the old mainframe-based Sabre that has carried AMR successfully in the past and has helped AMR, for the second year, take top place in the transportation industry and fourth place overall in *Computerworld*'s *Premier 100*. Sabre accounts for about 85% of American Airlines' earnings.

Stan Wolenski

AMR's Kiernan: *Like changing the wheels on a moving tractor trailer*

As long as American Airlines maintains control of Sabre processing, Starkman says he is not concerned about distributing the giant system. "It makes me more antsy to have everything in a bunker in Tulsa, as opposed to distributing it," he says.

AMR could not carve up Sabre until it unlaced the IBM operating system holding it together. During the past year, AMR spent 230 to 240 man-years swapping over to IBM's TPF 3.1 operating system. "It was analogous to changing the wheels on a tractor trailer while the truck was speeding along," Kiernan says.

One processing chunk AMR has already broken off the mainframe is crew planning — scheduling 8,000 pilots and 16,000 flight attendants. The application now runs on a Mips Computer Systems, Inc. processor and workstations, with the basic flight schedule data downloaded from the Sabre system.

LOOKING INWARD

AMR is also rethinking its internal computing needs, notably with the Interaact system. The aim of Interaact is to provide computing power to every knowledge worker at AMR.

With Interaact, Kiernan says, the various AMR IS groups are focusing on information sharing and providing users with the tools they need.

Beginning in August 1989, AMR put Interaact MS-DOS personal computers on about 1,400 desks in the Fort Worth headquarters and Los Angeles offices. However, the Interaact systems from AT&T, Tandy Corp. and IBM didn't provide the ease of use or Sabre response time users demanded.

"Quite frankly," Kiernan acknowledges, "we got too interested in rolling out the technology and getting users to change how they did work."

IS went back to the drawing board to "clean up the product" and focus on departments' and individuals' needs.

After the Sabre group reviewed users' needs for strong Sabre access, the Interaact Sabre emulation program was rewritten and enhanced.

"We've been on track since March," Kiernan says. "There's an absolute commitment to training [by all parties] and to looking at how people do their jobs."

While AMR is decentralizing its computing, it is centralizing its communications infrastructure on a global basis. Again, the decision is for cost and price/performance reasons.

Currently, AMR runs three separate networks: an older, 6-bit one for Sabre; an IBM Systems Network Architecture network for internal business; and the new X.25 configuration.

"The single X.25 network will improve reliability and reduce costs, most simply by eliminating the other two networks," Kiernan says.

AMR seems to be opening itself up to the new possibilities of technology, especially to provide better customer service. Besides a baggage bar-coding system, AMR is considering multimedia systems, compact disc/read-only memory and PCs that would store maintenance manuals or sales information and presentations for travel agents. □

What makes AMR IS so effective?

- Industry-leading computer reservation system.
- Willingness to improve on success.
- Moving computing power to end users.
- Clear understanding of where IS fits into the business.

WINKLER IS A NEW YORK-BASED WRITER AND CONSULTANT COVERING MANAGEMENT TECHNOLOGY

Transportation

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**AMR Corp.** Dallas, TX 95,800	4	28,100	$455	$1,214	124,000
2	**Chicago & North Western Co.*** Chicago, IL 7,562	14	27,250	($21)	$42	4,590
3	**Federal Express Corp.** Memphis, TN 87,000	28	26,625	$413	$234	30,000
4	**CSX Corp.** Jacksonville, FL 40,056	55	25,590	$770	$220	12,328
5	**American President Companies** Oakland, CA 4,396	105	24,245	$11	$95	4,300
6	**Continental Airlines Holdings, Inc.** Houston, TX 68,000	112	24,055	($886)	$300	130,000
7	**Delta Air Lines, Inc.*** Atlanta, GA 58,784	147	23,530	$461	$168	35,786
8	**United Air Lines, Inc.** Chicago, IL 71,000	183	23,010	$324	$306	19,000
9	**United Parcel Service*** Greenwich, CT 237,700	263	21,905	$693	$425	11,286
10	**NWA, Inc.*** St Paul, MN 39,323	294	21,465	$355	$133	9,981
	Medians for industry Top 10	109	24,150	$384	$227	15,664

Companies are ranked by industry according to CSX 100 Index. *Estimates are from *Computerworld* sources, not the company.

Building Systems From the Bottom Up

BY CLINTON WILDER

Mark Green

IS director White: *'We don't form a committee . . . and sit around.'*

Delegating responsibility to users is a big part of how Union Texas Petroleum's IS department does business

Some say that in order to strengthen information systems management, you have to give power away to business managers. At Unioo Texas Petroleum Holdings, Inc. in Houston, director of MIS Richard L. White says he believes that philosophy is a big reason why his company was ranked as the most effective user of IS in the petroleum industry for the second straight year.

For most of the major applications in the works at Union Texas, White has given project responsibility to a manager in the department that will use the application. In addition, an attempt to create a data model for Union Texas' global enterprise is primarily a project for users, not "data administrators" in IS.

"We tried in 1984 and 1985 to do it the way all the gurus said to do it — top down," White says. "That doesn't work in this organization. The people who use the data must define it."

Union Texas is one of the world's largest independent oil and natural gas producers, meaning it does no refining or "downstream" selling of its products to consumers. White says he believes that the company's sharp focus gives it an edge over much larger and more diversified competitors, and he tries to bring a similar focus to IS.

"If something is obvious, we don't form a committee of 25 and sit around deciding what to do," he says. "Decisions are made very quickly."

And with strong participation by users, systems are developed at a pretty good clip as well. The first phase of an IBM 3090 and DB2-based procurement tracking system that will completely automate the firm's purchasing was implemented ahead of schedule in August, less than two years after the specification process began.

White is almost zealous in keeping the IS focus on business rather than technology. Not that Unioo Texas doesn't use state-of-the-art technology in specific strategic areas, such as Landmark Graphics, Inc. software for seismic exploration or four new Sun Microsystems, Inc. Sparcstations for a new geo-

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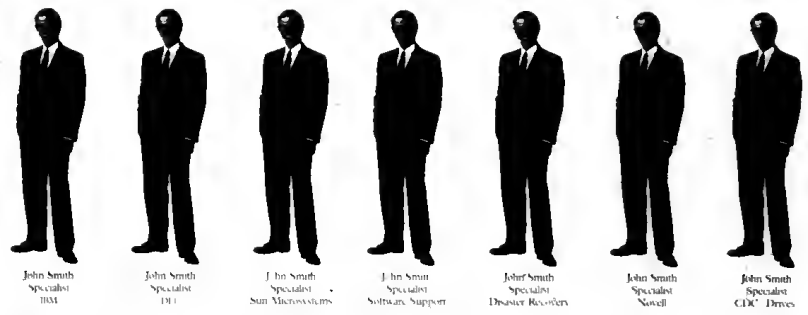

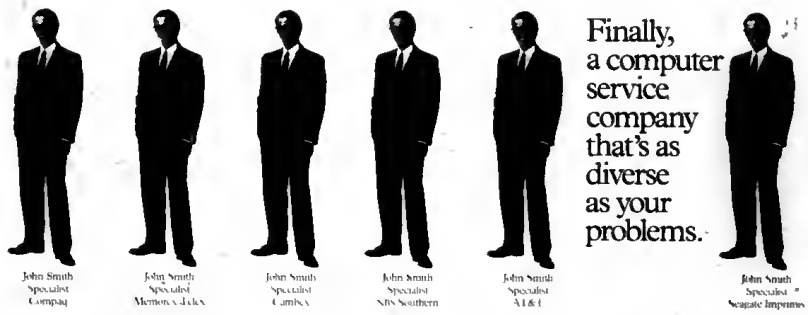

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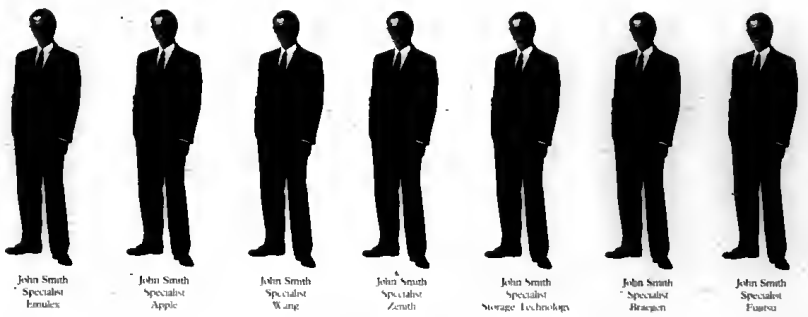

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Continued from page 38

logical/geophysical system.

However, you won't find any computer-aided software engineering tools in use here, although they are being studied; White says that client involvement is more important than new development tools. And don't ask him for the Sparcstation model numbers, because he won't know off the top of his head.

On the other hand, he and his department do understand, for example, the information needs of natural gas engineers who use 90 personal computers in Union Texas' operations in Karachi, Pakistan.

"We don't try to be all things to all people," he says. "If a petrophysicist finds a great piece of software, our job is not to go out and find a better one — it's to help him."

A good example of that philosophy is rigorous change control in systems development. Any proposed deviation from the development plan must be approved by both White and the user department manager responsible for the system. "Analysts may tell you that their changes will only take one day, but nothing only takes a day," he says. Among the systems projects under way at Union Texas are the following major applications:

- Procurement tracking system. Undertaken in response to an internal audit that dictated better controls on purchasing, the system will automate a previously cumbersome purchase order system that involved much rekeying of data and manual checking. The system will also give managers immediate access to vendor credit information to allow them to make better purchasing decisions.
- Joint interest billing system. Complex joint ventures play a big part in Union Texas' $1.16 billion business. A 37.81% interest in a joint venture supplying natural gas to an Indonesian gas plant is but one of dozens around the world. A rejuvenated billing system is intended to give Union Texas' joint venture partners more precise billing information so they will pay bills faster and improve Union Texas' cash flow. The upgraded system will also feature better integration with other functions, such as accounts payable and materials transfer.
- Journal voucher entry system. A new system will bring 48 new PCs to accounting department employees for on-line entry, eliminating many "three- to six-floor elevator rides" to carry documents to the data entry department. The new PCs were cost-justified on the basis of eliminating several data entry jobs.

Whether Union Texas can make it three straight years as a *Computerworld Premier 100* industry leader in IS, however, may be out of White's hands. Last spring, Union Texas owners Kohlberg Kravis Roberts & Co. and Allied-Signal, Inc. announced that the company is up for sale. That in itself gave IS a new responsibility: supporting a "data room" where prospective buyers from around the world can examine data on everything from oil rigs to shale deposits to employee benefits.

The sale of Union Texas may be announced before the end of the year, but with the exception of 1991 budgets, life in IS is proceeding as normal. "Our people still take a lot of pride in their systems and in meeting their schedules," White says. "No one's pulling their horns in." □

WILDER IS COMPUTERWORLD'S SENIOR EDITOR, MANAGEMENT.

What makes Union Texas IS so effective?

- User department managers responsible for new systems specs and project management.
- Rigorous change control in systems development.
- IS staffed at or below previous year's level.
- Quarterly meeting of MIS Operating Committee approves IS spending above $50,000.

Petroleum

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Union Texas Petroleum, Inc.** Houston, TX 1,900	5	27,905	$173	$18	1,800
2	**Atlantic Richfield Co.** Los Angeles, CA 27,200	31	26,465	$1,953	$237	15,000
3	**Oryx Energy Co.** Dallas, TX 2,920	32	26,455	$124	$27	3,200
4	**Phillips Petroleum Co.** Bartlesville, OK 22,310	33	26,440	$219	$160	13,470
5	**Mobil Corp.** New York, NY 67,900	68	25,180	$1,800	$740	40,000
6	**Freeport McMoran, Inc.** New Orleans, LA 3,700	70	25,150	$150	$17	1,000
7	**Sun Co., Inc.** Radnor, PA 16,500	78	24,980	$85	$80	5,600
8	**Louisiana Land & Exploration*** New Orleans, LA 700	86	24,735	$44	$7	846
9	**Enron Corp.*** Houston, TX 6,296	96	24,430	$226	$121	3,468
10	**Shell Petroleum, Inc.*** Houston, TX 31,338	122	23,875	$1,405	$200	21,376
	Medians for industry Top 10	**69**	**25,165**	**$196**	**$101**	**4,534**

Companies are ranked by industry according to CW 100 Index. *Estimates are from *computerworld* sources, not the company

99% Perfect Not Enough for General Dynamics

Systems steer the quest for flawless quality control at aeraspace firm

Doug Mckay

General Dynamics' Hall *demands top quality*

BY MITCH BETTS

It seems like such a small difference, the one between 99% and 100% quality. But for General Dynamics Corp. and other devotees of the Total Quality Management (TQM) philosophy, it is a very big difference indeed.

Consider, for example, that 99% quality control at the U.S. Postal Service would mean the loss of 17,000 letters per hour. At the nation's hospitals, it would mean 30,000 newborn babies accidentally dropped each year.

At St. Louis-based General Dynamics, the nation's No. 2 defense contractor, TQM means building tank hatches with a 100% seal and building information systems that *exactly* meet the requirements of the business units. As a general rule, it means making continuous process improvements to ensure that things are done right the first time.

No one claims that General Dynamics has reached perfection in any area, but the very fact that it tries so hard may help to explain why it ranks as the top aerospace company in the *Computerworld Premier 100* for the second straight year.

"We are heavily into TQM ... trying to compare how we're operating vs. the best practices in the information systems field," says Asaph "Ace" H. Hall, corporate vice-president and general manager of the Data Systems Division.

For Hall, the beauty of TQM is that it calls for the involvement of all employees in the relentless pursuit of quality and customer satisfaction. "I'm convinced there's a lot of gold there, because people get very excited when they're empowered to go out and find better ways to do things," he says.

Within the Data Systems Division, for example, one of the five "critical process teams" is focusing on the process of defining user requirements for applications software — and the team leader is a user. The goals are to find out what users *really* want out of a system and define those specifications faster, according to Larry Feuerstein, the division's vice-president of planning and quality assurance.

By improving the quality of the requirements-definition phase, General Dynamics hopes to avoid those situations in which the system has to be reworked because "you didn't get clear indications from the user or you weren't talking to the real user and you find out at the first review that you didn't really understand the requirement," Feuerstein says.

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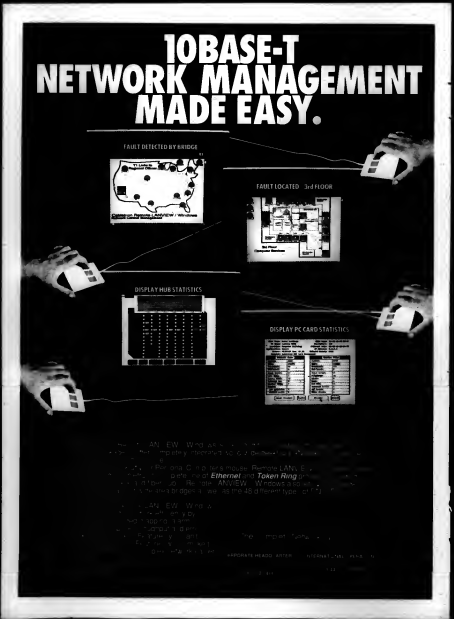
10BASE-T
NETWORK MANAGEMENT
MADE EASY.
FAULT DETECTED BY BRIDGE
FAULT LOCATED 3rd FLOOR
DISPLAY HUB STATISTICS
DISPLAY PC CARD STATISTICS

Continued from page 41

The Data Systems Division is also heavily involved in the quality-improvement projects at the other business divisions. A few years ago, Hall says, "somebody would have thrown a requirement over the wall and told us to code a system to do this. Now we help them improve the process before they even consider how to automate it." The key, he adds, is getting IS staff members included in the project team at the outset.

The biggest change at the IS unit over the last few years, Hall says, is that "we have moved even more toward the business orientation — having a direct relationship with the business of General Dynamics — as opposed to being as technology-driven as we may have been in the past."

The big problem is that the business of General Dynamics is headed for some hard times now that the Cold War is over and lawmakers are preparing to slash the defense budget. Wall Street analysts say they expect the firm's earnings, which were about $7 per share in the past two years, to fall to $6.54 per share or lower this year.

As unseemly as it sounds, the only good news for the arms maker is that protracted turmoil in the Middle East may boost its foreign sales of M-1 tanks and F-16 fighters, as well as curb Congress' appetite for military budget cuts, according to analyst Paul H. Nisbet at Prudential-Bache Securities, Inc.

Nevertheless, General Dynamics has announced layoffs of 1,500 to 2,000 workers through 1991, and analysts say it will have to continue to "tighten up and buckle down."

The Data Systems Division is consequently busy trying to streamline operations and cut spending to stay "in sync" with the business units. "Over the next three to five years, we're looking at something like a one-third reduction in our IS business, strictly as a result of what's happening in the aerospace business," Hall says.

General Dynamics is looking at some outsourcing options — it has already handed its wide-area network to AT&T under an $18 million Tariff 12 contract — but prefers to use outsourcing only for selected pieces of its IS operation. "We are not in the Kodak mode here of giving everything away," Hall says, referring to the full-scale outsourcing initiative at Eastman Kodak Co.

To outsiders, General Dynamics is best known for its accomplishments in factory automation, particularly at its plants in Fort Worth, Texas, and San Diego. At the Forth Worth facility, for instance, robots handle complex drilling tasks, apply sealant and install the correct rivets to assemble the F-16 aircraft.

What makes General Dynamics IS so effective?

- **Clearly stated IS management vision.**
- **Strong commitment to IS quality program.**
- **Strong user role in defining applications.**
- **Advanced factory-automation applications.**

"I've seen their paperless factory in San Diego and that seems like quite an advanced application," adds Richard Howard, the top IS executive at Northrop Corp. But technology aside, Howard says that General Dynamics' real strength is having a clearly stated vision for IS management.

Describing that vision, Feuerstein stresses that the Data Systems Division is run strictly as a service business, not as a "technical wonderland" or a collection of fragmented programs. "The customers are the other divisions of the company, so we work on things that are directly linked to the satisfaction of our division customers," he says. □

BETTS IS COMPUTERWORLD'S WASHINGTON, D.C., BUREAU CHIEF.

Aerospace

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**General Dynamics Corp.** St. Louis, MO 95,000	6	27,855	$293	$585	28,000
2	**Gencorp, Inc.*** Fairlawn, OH 15,100	10	27,525	$210	$40	8,700
3	**Martin Marietta Corp.** Bethesda, MD 46,200	16	27,150	$307	$291	20,100
4	**Allied-Signal, Inc.*** Morristown, NJ 107,100	24	26,880	$528	$372	33,543
5	**Grumman Corp.** Bethpage, NY 28,000	41	26,055	$67	$241	16,200
6	**The Boeing Co.** Seattle, WA 164,500	49	25,715	$675	$1,164	91,964
7	**Northrop Corp.** Los Angeles, CA 38,000	51	25,625	($81)	$290	22,500
8	**United Technologies Corp.** Hartford, CT 190,400	59	25,475	$701	$847	35,918
9	**McDonnell Douglas Corp.** St. Louis, MO 127,000	65	25,318	$219	$755	70,000
10	**Teatron, Inc.** Providence, RI 54,600	66	25,285	$259	$252	24,000
Medians for industry Top 10		**45**	**25,885**	**$276**	**$332**	**26,000**

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the companies.

Joyce Ravid

Benmosche *says employee contributions and interest keep Paine Webber in fighting shape*

Strong Focus on People Powers Paine Webber

BY AMIEL KORNEL

On a clear day, staff members working up a sweat at Paine Webber, Inc.'s corporate health club have a panoramic view of downtown Manhattan. Wall Street's glass and steel peaks across the Hudson River are a constant reminder that they — and their company — need to stay in fighting shape.

These days, competing on Wall Street can challenge even the toughest players. To keep in the game, Paine Webber has whipped its information services unit into a trim, agile team. While information technology is highly valued at the company, the stock brokerage places a premium on what it considers its most valuable corporate asset — its employees.

"When you empower your people and make them feel they can contribute more to the organization, they produce more and you earn more," says Robert Benmosche, director of operations and systems.

Under the guidance of 46-year-old Benmosche, Paine Webber has implemented a number of measures that have helped keep information systems staff people motivated, highly skilled and loyal. This is no small feat in an industry renowned for its high employee turnover and fast-paced technological changes.

One of the world's largest securities brokerages, Paine Webber saw net earnings rise 4.8% to $25.4 million during the first six months of 1990, compared with the same period in 1989. Half-year revenue rose 11% to $1 billion.

As a result of the company's innovative management of its people, operational costs have shrunk while satisfaction with corporate IS services has grown.

The most visible such effort came during a cost-cutting measure in 1988, when the company moved its IS and operations facilities from the frenetic streets of downtown

Manhattan to slower-paced and lower-priced Weehawken, N.J.

The transfer across the Hudson was controversial at the time. Wall Street firms generally prefer keeping their technological nerve centers close to the action, and management feared a backlash from employees disgruntled with the move. Shareholders were not sure whether to cast a sympathetic eye, either: According to company financial statements, setting up and transferring to the new facilities cost about $50 million.

No one seems to doubt the wisdom of the move today, however. The new operations and systems facilities rent costs a third less than office space in Manhattan, Benmosche says. Also, the recent Manhattan power outage that shut down IS shops at many Wall Street firms for several days, forcing them to scramble to backup sites, made Paine Webber's move across the Hudson seem almost prescient.

Perhaps most importantly, the overwhelming majority of the stock brokerage's operations and systems staff have stayed with the company, Benmosche says. Eighty percent of the 740 IS people working for the company before the move are still with Paine Webber today, he says. Of the 20% that left, half did not need to be replaced thanks to improved efficiencies and productivity at the new site.

How did the company manage to hold onto its staff in spite of the upheaval invariably caused by a move?

The conveniences of the modern, spacious facilities, complete with health club, have helped preserve and even boost staff morale, according to Benmosche. The secret, however, seems to lie in a number of programs designed to afford employees continued training and high job mobility. "When you are ... committed to the people and their development," Benmosche says, "that tends to reduce turnover."

Benmosche, who worked as human resources chief at Chase Manhattan Bank NA, among his many previous professional incarnations, conducted an attitude survey among Paine Webber's IS staff in January 1989. He found that people believed that the firm did not offer them adequate career paths. "They said, 'We're not learning enough about the basic business, and we're not growing,'" according to Benmosche.

What makes Paine Webber IS so effective?

- Minimal employee turnover.
- Policy of 'empowering' employees.
- Strategic relationships with major vendors.
- Move to distributed processing.
- Cost efficiency the No. 1 priority.

Many staff members also demonstrated a surprising lack of knowledge about the firm's business. "They didn't understand how to solve problems; they only knew how to do their work," he says.

As a result, the company started a four-day course teaching employees the ins and outs of the brokerage business. It included field trips through the company as well as to the floor of the New York Stock Exchange.

Benmosche and his recently appointed chief information officer, Robert McKinney, have a mandate from Chairman and Chief Executive Officer Donald Marron to stay on top of the latest product offerings. No less than the company's survival is at stake.

"If you look at the last 20 years on Wall Street," Benmosche notes, "those who didn't keep pace with the technology and the efficiencies [it offered] were gobbled up by someone else." □

KORNEL IS A COMPUTERWORLD SENIOR EDITOR, FEATURES.

Financial Services

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Paine Webber, Inc.*** New York, NY 12,900	7	27,755	$52	$200	10,357
2	**American Express Co.** New York, NY 105,000	26	26,675	$1,157	$874	70,000
3	**Pacific Mutual Life Ins. Co.*** Newport Beach, CA 3,471	34	26,420	$28	$57	1,900
4	**Salomon, Inc.*** New York, NY 8,900	36	26,395	$470	$335	6,105
5	**General Re Corp.*** Stamford, CT 2,379	44	25,855	$599	$87	1,920
6	**Mass. Mutual Life Ins. Co.** Springfield, MA 10,000	53	25,615	$124	$75	6,000
7	**New York Life Ins. Co.** New York, NY 18,200	54	25,600	$1,452	$156	10,000
8	**The Prudential Ins. Co.** Newark, NJ 100,209	57	25,550	$743	$818	65,200
9	**Primerica Corp.** New York, NY 24,000	58	25,480	$289	$183	15,625
10	**Metropolitan Life Ins. Co.** New York, NY 46,000	63	25,320	$300	$433	35,882
	Medians for industry Top 10	51	25,735	$385	$192	10,179

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company

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Centralized, Revitalized IS Brings Sears into the '90s

Bigger, leaner Sears uses 'insourcing' to downsize and shake competition

BY JOSEPH MAGLITTA

Ask the average shopper about Sears, Roebuck and Co., and you'll hear of power tools, refrigerators, lawn mowers and chunky catalogs. True, the $54 billion company is still the country's largest retailer. But Sears has changed.

For the past decade, Sears has bounced through a dizzying series of corporate maneuvers and refocusing that would give most information systems departments a bad case of the heebie-jeebies. Yet Sears' IS has not only survived these mega-changes, it has evolved and *prospered*.

Today, the Chicago-based giant is aggressively using information technology to help shake off a dowdy retail image and propel it past a pack of fierce competitors and into the 1990s.

"We are technical enablers," says Charles A. Carlson, president of Sears Technology Services, Inc. (STS), the company's 1-year-old technology arm. STS both supports and drives company consolidation and integration efforts using a simple, back-to-basics approach: "Provide the best possible service at the lowest price."

Several steps taken during the last 18 months — including a major IS reorganization, data center consolidation, heavy network and electronic data interchange (EDI) spending and "insourcing" — have helped make Sears a sharper user of information technology. Already, these moves have helped the company keep pace with its fast-moving businesses and have rocketed Sears to the top of the retail industry ranking in the 1990 *Computerworld Premier 100*.

Analysts say that the savvy use of technology could be just the ticket needed to continue growth of the many diversifications undertaken by Sears during the 1980s. Hounded by hungry retailers such as J.C. Penney Co., Wal-Mart Stores, Inc., The Limited, Inc. and others, Sears expanded into financial services (Dean Witter Financial Services, Inc.), real estate (Coldwell Banker), credit (Discover card) and on-line services (Prodigy Services Co.), while expanding its Allstate Insurance Co. arm. The granddaddy of retailing also opened 779 smaller specialty shops, specializing in everything from eyeglasses to paint to computers.

While Sears is heavily computerized — it is said to be IBM's largest customer and owns the world's biggest Systems Network Architecture network — it has historically been unable to parlay the investment into any real strategic advantage, says Walter F. Loeb, a New York retail analyst and veteran Sears watcher.

David Joel

Sears' Carlson: IS *is helping Sears change the way it does business*

But recent downsizing and centralization have helped transform Sears into a more focused, effective user of information technology, Carlson says.

With profit up 3.8% to $1.5 billion in 1989, Sears is spending a whopping $950 million this year on information processing and networking, up 20% from the previous year. Much of that amount will go

toward expanding and integrating Sears' vast network of some 250,000 personal computers and terminals.

"We've focused heavily on building a solid, total information processing network and architecture," Carlson explains. "We want this network to be seamless."

Neither is Sears afraid to rattle the glass house. In January 1989, top management dissolved divisional IS operations and formed STS, the centralized IS unit. Headed by Carlson, STS handles IS and communications for all of Sears except Allstate, which receives only network support.

Carlson explains that "the goal was to free up the business units so that they could concentrate on business applications and not worry about *where* they were going to run and *how* they were going to run." Divisions now do their own applications development; STS gives consulting, procurement and implementation help as needed.

What makes Sears IS so effective?

- **Insourcing centralizes IS; business units handle application development.**
- **Consolidated data centers save millions.**
- **Strong corporate commitment to IS, as shown by $950 million budget.**
- **Aggressive EDI program requiring its 5,000 suppliers to participate**

Another facet of the new IS strategy is what Sears calls insourcing. The centralized group, Carlson says, is an information utility. Users are charged for networking, processing and consulting services.

In another move aimed at cutting costs and centralizing power, Sears condensed its 10 scattered data centers into three "supercenters" located in Dallas; Columbus, Ohio; and Schaumburg, Ill. Carlson says the 16-month project, which was completed this spring, has already saved "millions" in operating costs and salaries.

Yet despite the cutbacks, Sears hasn't ignored new technology. The company is currently using or testing several advanced technologies, including radio frequency terminals in its service vans, expert systems, compact disc/read-only memory, IBM's Officevision, imaging in its catalog operations and video conferencing at nearly 800 sites, according to Dirk Van Alystyne, a Sears senior communications specialist and IS strategist.

Moreover, Sears is pursuing EDI in what Carlson describes as "a very big way." Early this year, Sears announced that its 5,000 suppliers would be required to transact business exclusively via EDI. All of its suppliers will be using EDI by 1992, he says.

To encourage use by small vendors, Sears provides a free EDI software package, free training and discounted IBM Personal System/1 computers. Suppliers can get started for as little as $1,000. So far, about 1,000 suppliers are using some form of EDI.

These new technology initiatives appear to be paying off. User chargeback costs have dropped during the last two years, Carlson says. Effective computerization has trimmed per-transaction costs for the Discover card to 5 cents below the industry average, he says. Annual handling expenses are $10 per account less than those of competitors, he adds.

Analysts say that it's too early to tell if technology will propel Sears into the 21st century. But the potential for new products and services is huge, says Edward A. Weller, a retail analyst at Montgomery Securities in San Francisco. With Sears' massive network and customer files, "the cross-indexing possibilities are endless," he says.

The company has also hired Harvard Business School guru Michael Porter to examine its IS operations and is considering an advanced point-of-sale system. □

MAGLITTA IS A COMPUTERWORLD SENIOR EDITOR, FEATURES.

Retailing

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Sears, Roebuck and Co.** Chicago, IL 444,400	12	27,390	$1,509	$990	332,350
2	**Carter Hawley Hale Stores, Inc.*** Anaheim, CA 37,000	87	24,725	$14	$42	13,394
3	**J. C. Penney Co.** Dallas, TX 198,000	95	24,435	$802	$201	89,000
4	**The Vons Companies** El Monte, CA 35,000	138	23,645	($10)	$46	5,500
5	**Melville Corp.** Harrison, NY 97,000	268	21,815	$679	$111	4,400
6	**The Limited, Inc.*** Columbus, OH 63,000	273	21,785	$347	$43	4,011
7	**Food Lion, Inc.*** Salisbury, NC 40,736	282	21,665	$140	$40	3,868
8	**Price Co.*** San Diego, CA 12,545	295	21,455	$117	$43	782
9	**Toys R Us, Inc.*** Rochelle Park, NJ 38,039	301	21,375	$321	$42	3,818
10	**Walgreen Co.*** Deerfield, IL 50,000	346	20,785	$154	$52	6,089
Medians for industry Top 10		271	21,800	$238	$45	4,950

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company.

Key to D&B: Mastering Information Volume

Dun & Bradstreet boosts sales with investment in IS

BY JIM NASH

Few companies deal with the quantity or range of data mastered by The Dun & Bradstreet Corp.'s information systems staff. In fact, at D&B, the database *is* the business. To this end, the firm maintains files containing hundreds of data elements on about 10 million to 12 million U.S. companies. Every day, approximately 100,000 file inquiries from customer service representatives and clients are logged.

The information D&B must track "is far bigger than any relational database constructed today," says Michael Field, president of the diversified service company's Business Information Group.

For this reason, the company requires a commensurately large IS investment: $750 million (about 17%) of $4.3 billion in 1990 sales. This investment was swelled in 1990 by the acquisition of Management Science America, Inc. in Atlanta, one of the largest general-ledger software vendors.

However, management is willing to spend the money to fuel continued growth and little wonder: In 1989, D&B profits jumped 17.5% to $56.4 million. The combination of effective investment in IS and solid business performance helped rank D&B at the top of its industry group and No. 11 overall in the 1990 *Computerworld Premier 100*.

Reinhold Spiegler

Dun & Bradstreet's Field: *Switching to low-cost PC platforms*

The company segments its operations six ways: risk management, directory, marketing and financial information services as well as business services and its in-house Corporate Resource Group.

Each D&B division depends on large amounts of business and consumer data. Donnelley Directory compiles and publishes Yellow Pages directories. D&B Business Credit Services provides credit reports on more than 9 million businesses. Moody's Investors Service, Inc. rates corporate and government bonds. Nielsen Marketing Research measures point-of-sale success and television advertising's audience.

With all the services, D&B seeks to tame the overwhelming wave of spending data that its technology can now collect. Businesses have a twofold use for D&B's data: They turn to it when trying to buy or sell products from other firms — or the firms themselves. They also use it to better understand consumers and sell to them. With Moody's Investors Service, for example, consumers can better understand companies, at least for investment purposes.

As providing information services using database technology moves closer to becoming a commodity market, D&B faces new challenges to its leadership

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position. To increase product development and customer use of its information services, D&B is in the midst of a multiyear effort to make its files available on lower-cost, more accessible personal computer platforms. Accomplishing this task to satisfy 70,000 employees and millions of customers is, to say the least, a difficult undertaking.

As the man charged with this megamission, Field — who is also corporate vice-president of consumer IS — has been working to remove mainframes from mainstream tasks, reserving them for roles as large database servers. This goes for both sides of D&B's house: the traditional business-to-business information side and the newer consumer-oriented side. After six years of playing the downsizing theme, Field is only now hearing the chorus sing along. That chorus is composed of managers in 26 decentralized divisions, each of which is autonomous.

Field's efforts are helping provide the platforms for D&B's latest products. Industry sources point to People Meter, the new data collection system used by D&B subsidiary Nielsen Marketing (formerly A.C. Nielsen). People Meter uses a wireless television remote control to replace the diaries previously used by volunteer TV watchers to record viewing habits.

On one hand, People Meter records viewing habits more faithfully. Viewers who watched "Three's Company" but logged a public-television documentary largely lost the fudge factor. On the other hand, recalcitrant subjects and technophobes skewed results by not using the device or by keying incorrect data. The resulting information seemed to indicate that fewer people were watching television.

The problems with the way the results were achieved and the fact that the findings were "contrary to what [advertising] companies wanted to hear," one analyst says, cost D&B a chunk of its reputation as an accurate data gatherer.

Undaunted by such criticism, D&B is working on a new product, says independent marketing and sales information consultant Bill Purcell in Palos Verdes, Calif. The new product works passively, using image recognition to record who is watching which program, Purcell says.

Critics and fans agree, however, that D&B does not wait for mistakes to improve on its products. Several analysts cited products under development at Nielsen Marketing that offer virtually up-to-the-minute sales figures at grocery and drug stores nationwide.

What makes D&B IS so effective?

- **Pioneer in information services market.**
- **Long-term commitment to accessible information technology.**
- **Proven ability to learn from mistakes.**
- **Close link between technology and the business.**

One such product, called Store*Link, would connect the ubiquitous laser scanners at store checkout counters to data collection systems, says John Costello, president of Nielsen. Corporate mainframes would collate the data into profiles prepared by D&B's customers.

"Store*Link could be a dramatic improvement in scanning technology," Purcell says. "All scanner data in general has acted as an abacus, counting one more can of Coke sold."

Programs such as Store*Link exhibit the technological goals Field is striving to achieve. They use an integrated database sporting an easy-to-use interface and offer personalized client services. "They show the level of investment [that companies] are willing to make," Purcell says. □

NA$H IS A COMPUTERWORLD WEST COAST BUREAU CORRESPONDENT.

Diversified Services

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**The Dun & Bradstreet Corp.** New York, NY 70,000	11	27,465	$586	$750	50,000
2	**The Hertz Corp.** Park Ridge, NJ 30,000	116	23,940	$108	$94	8,300
3	**Dow Jones & Co.** New York, NY 9,818	118	23,925	$317	$17	7,540
4	**Paramount Communications, Inc.*** New York, NY 11,000	156	23,390	$1,465	$64	5,379
5	**Alco Standard Corp.*** Wayne, PA 17,700	157	23,385	$171	$92	3,673
6	**ARA Group, Inc.*** Philadelphia, PA 125,000	200	22,755	$39	$93	2,815
7	**CBS, Inc.** New York, NY 7,000	203	22,735	$150	$36	2,500
8	**American Financial Corp.*** Cincinnati, OH 53,000	211	22,630	$3	$146	5,657
9	**Capital Cities/ABC, Inc.*** New York, NY 19,860	222	22,525	$486	$63	6,421
10	**Humana, Inc.*** Louisville, KY 55,100	226	22,450	$256	$72	8,941
	Medians for industry Top 10	179	23,070	$214	$82	6,039

Companies are ranked by industry according to CW 100 Index. *Estimates are from Computerworld sources, not the company.

Gillette Information Systems Stays Close to the Business

BY JOANNE KELLEHER

Seth Resnick

Gillette's Moller *(left) and Standish re-examine basic assumptions*

Gillette Co., having survived to the venerable age of 89, has learned that sometimes it *does* make sense to reinvent the wheel.

The most visible new wheel the firm has created lately is the hot-selling Sensor razor, which the investment firm Morgan Stanley Group, Inc. estimates will account for $210 million in sales of razors and blades by the end of 1990. Introduced simultaneously in 19 countries across North America and Europe last January, Sensor embodies many of the business objectives that drive Gillette and its information systems organization.

The silver and black razor is based on a spring-mounted design unique in the annals of beard-removal technology. Ten designers collaborated on the project, using Prime Computer, Inc.'s Calma three-dimensional computer-aided design software running on Digital Equipment Corp. VAX 11/785-connected workstations.

Although the razor was in development for years, a marketing decision regarding the look of the product turned the last 18 months before introduction into an intricately choreographed race against the clock. While the product design team pushed for a more attractive and higher tech look for the product, 50 other designers monitored their progress and translated the new specifications into new factory machines.

Gillette took on a major manufacturing challenge with the Sensor, its first razor introduction in 10 years. Because almost all of the 230 component parts and processes were different from those used by any of the company's other razor products, a completely new production line had to be devised, virtually in parallel with the evolution of the design.

The need for fast turnaround and design flexibility was particularly dramatic with the Sensor introduction but, according to Herbert Moller, corporate vice-president and director of IS, these requirements are becoming much more pronounced in all phases of business.

For that reason, he says, the overriding priority for IS throughout the organization is to synchronize its pace with the accelerating tempo of business.

"The thrust of a lot of our activities," Moller says, "is to help compress planning cycles. That means designing applications in such an elegant way that you are able to change what you did yesterday with relative ease."

There is no template for the kind of

applications that Moller is talking about. As Ted Standish, director of IS for the Gillette North Atlantic Group observes, "We used to design applications by going to the person doing a job and asking him how he did it. That doesn't work anymore because the way a job has been done in the past may not be the way we want it done in the future. Basically, we've stopped hard coding organizational assumptions into programs."

Re-examination of basic assumptions has been an almost continuous process at Gillette ever since its major restructuring 2½ years ago. One of the results of that restructuring was the creation of the North Atlantic Group to treat the U.S., Canada and Europe as a single market for shaving and personal care products. Translating that idea of market unity into operational cohesion has meant subjecting the data definitions and data-producing systems in use across the two continents to close and ongoing scrutiny.

"If you are going to treat these areas as an integrated market," Standish says, "then clearly you need to get common information. The critical part of the process is determining how difficult it is to get common information using existing systems. The answer to that is the key to deciding where standardization is necessary."

Gillette's European IS groups decided to standardize on IBM's System/38 as a common hardware platform in 1984. Since then, the seven major European centers have moved steadily in the direction of full software and administrative compatibility — a goal that Derek Munson, MIS manager at Gillette in Europe, recently estimated will be reached in 1992.

With European operations well on their way toward smooth exchange of management information, Standish says, the next step is to figure out where and how to merge information flow throughout the entire North Atlantic region.

Top priorities include figuring out how to make information on finished-goods inventories in Europe and North America available in combined form on a daily basis and devising a means of retrieving sales information for the top accounts across geographic boundaries.

One vehicle for advancing this type of informational coordination is a professional advisory board, which was created this year. The board, Moller explains, consists of IS managers from the various business units as well as a number of key staffers from the corporate IS group. The board's purpose is to help maintain the delicate balance between functional decentralization of IS and the need for coordinated information handling.

What makes Gillette IS so effective?

- **IS keeps pace with fast business.**
- **Technological integration of North American and European markets.**
- **Professional advisory board coordinates decentralization.**

The corporate IS group headed by Moller operates a central data center providing processing and programming services to the shaving and personal care and stationery products businesses. It also has responsibility for policy decisions about IS infrastructure and technology standards across the company. Rather than trying to make such decisions by fiat, however, Moller has chosen to operate in more of a participatory mode, soliciting suggestions from the board on matters such as the selection of new technology areas for investigation. □

KELLEHER IS A COMPUTERWORLD FEATURES EDITOR.

Consumer Products

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Gillette Co.*** Boston, MA 30,000	13	27,375	$285	$112	8,500
2	**Polaroid Corp.** Cambridge, MA 11,000	42	26,015	$145	$62	5,000
3	**McGraw-Hill, Inc.*** New York, NY 14,461	72	25,135	$48	$132	6,824
4	**Colgate-Palmolive Co.*** New York, NY 24,100	88	24,715	$280	$77	5,950
5	**Jostens, Inc.*** Minneapolis, MN 8,264	100	24,365	$54	$16	1,852
6	**Eastman Kodak Co.*** Rochester, NY 137,750	169	23,135	$529	$282	40,914
7	**Knight-Ridder, Inc.*** Miami, FL 21,000	175	23,095	$247	$39	8,291
8	**Avon Products, Inc.*** New York, NY 34,500	192	22,865	$55	$36	5,909
9	**Harcourt Brace Jovanovich, Inc.*** Orlando, FL 15,000	220	22,545	$72	$35	1,800
10	**Unilever U.S., Inc.*** New York, NY 30,567	223	22,495	$139	$22	8,562
	Medians for industry Top 10	135	23,750	$142	$51	6,387

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company

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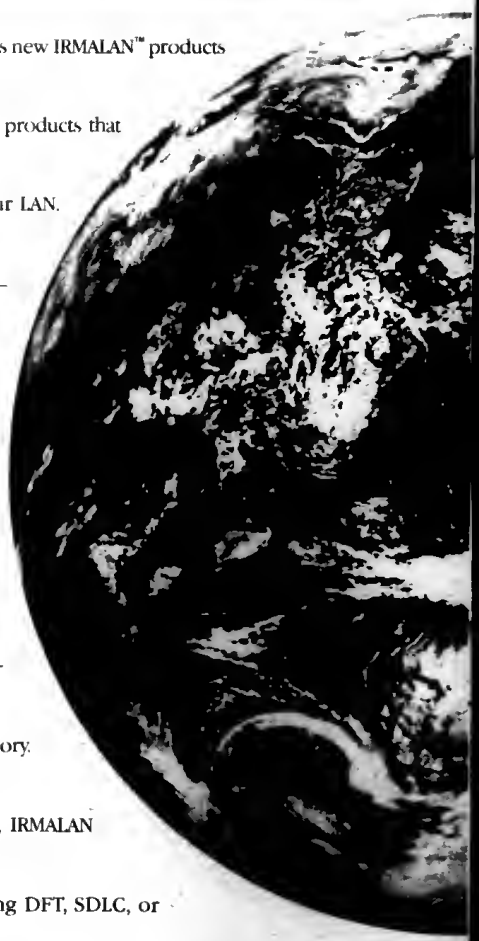

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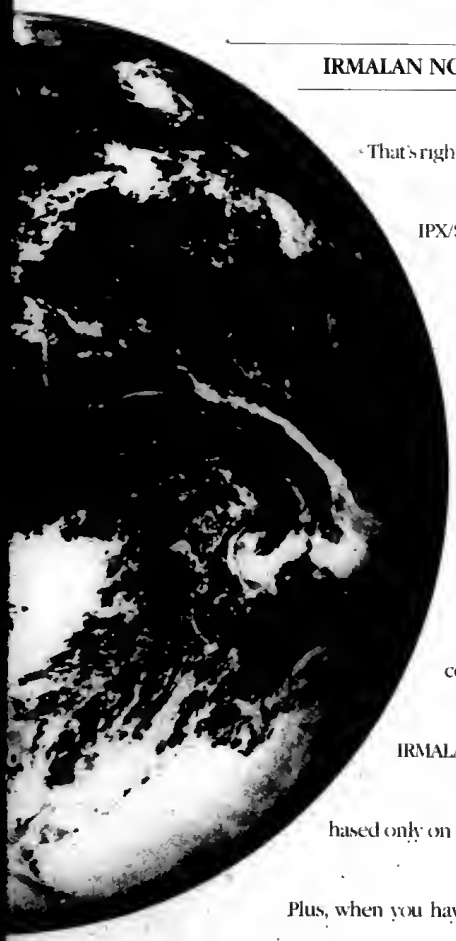

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3M's Kuhrmeyer: *We do strategic planning throughout the company*

Sticking With Innovation

3M uses systems to adapt to changing customer needs

BY ALAN J. RYAN

AND MICHAEL SULLIVAN-TRAINOR

The only sticky situations tolerated at 3M Co. are those involving consumers using Scotch Tape or Post-it Notes or workers adhering to the company's policy of innovation.

Thanks to the strategic use of information systems at the Minnesota Mining & Manufacturing Corp., troublesome situations with customers are rare. For example, when ordering any of its more than 60,000 diverse products — such as software diskettes, Bufpuf skin care products, tape products, paint stripper, Scotchgard fabric protector, sandpaper, medical diagnostic equipment and masking tape — from any division worldwide, the customer is always identified by the same ID number. It makes life easier for the customer and for 3M.

Computerized IDs are just one way in which 3M is using systems to help meet its business needs and one reason why 3M has been named to the *Computerworld Premier 100* list as the most effective user of information systems in manufacturing.

"One of the key tenets to 3M's success is its ability to adapt to meet new and different customer needs," says Theresa M. Gusman, an analyst at Salomon Brothers, Inc. With a presence in more than 50 countries worldwide, 3M is doing just fine, she says.

Sales for the St. Paul, Minn.-based manufacturing giant were $126 billion last year, and earnings amounted to just over 10% of that figure. Projected 1990 earnings for the corporation, which got its start as a mining company, are $13.4 billion. Last year, 3M passed the $1 billion mark in export sales, according to published reports.

"They tend to hold leadership positions in their markets, and in most cases, they dominate the markets," Gusman says. Much of that success is because they keep on top of the needs of the ultimate customer — the consumer.

The primary reason 3M's IS operation is effective is because of its strong adherence to standards and its ability to anticipate the requirements of the innovative corporate culture. This is not an easy task in a company that pumps out, on the average, 200 new products annually.

"All through the company we do strategic planning,"

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says Carl A. Kuhrmeyer, vice-president of administration and the company's highest ranking IS official. "The company expects each unit to innovate and come up with new ideas," he says.

That's where IS fits in. "We provide the infrastructure. We facilitate the business units' abilities to carry out their ideas," Kuhrmeyer says. "An operating division may not realize it needs a global database today," he adds, "but they may need one two years from today because of new products they are planning. We start developing that now and anticipate their needs."

3M is organized along product lines into 60 different business units. IS support for these units ranges from a large central organization, which reports to Kuhrmeyer, to IS groups and individuals that report to the business unit executives. All told, the company has 87,000 employees, 2,700 of whom work in IS.

"We work very closely with the operating groups so that we know what's coming," Kuhrmeyer says.

Operating under Kuhrmeyer is Donald H. Siegfried, staff vice-president of IS and data processing. Siegfried's group, based in St. Paul, tells 3M buyers of systems from all around the country that the preferred vendors include IBM, Digital Equipment Corp. and Hewlett-Packard Co.

However, divisions and user departments — there are 175 3M factories in the U.S. alone — are free to make their own choices if they feel there is a real need to go with a nonpreferred vendor or product. The company encourages that kind of innovation.

For instance, Unix had been in use on some manufacturing floors for 18 months before it got support from the central IS operation. The manufacturing people wanted the systems and put them in.

In fact, IS operates much like the rest of the company with respect to innovation — new ideas will be encouraged and implemented no matter where they originate. "It's a way of life," Kuhrmeyer says.

For example, if a division develops a new application or process, the central group will adopt it without having to take it over, he adds. However, there is also a strong emphasis on standards within a single product line. "A plant in Germany will use comparable systems to one in the U.S. to ensure the same quality, cost and delivery," Kuhrmeyer says.

What makes 3M Corp. IS so effective?

- **Fanatical dedication to innovation and flexibility**
- **Adherence to IS standards to ensure consistent product quality**
- **Emphasis on strategic planning to anticipate future needs**
- **Longevity of top management**

Siegfried, who has been at 3M for nearly 40 years and is one of many long-term employees, is working with a 1990 IS budget of $469 million. An additional $100 million will be spent on end-user activities other than personal computers and telephone equipment, according to Darril Wegscheid, manager of IS and data processing information planning. Of that money, nearly half will be spent on personnel, including salary, benefits, travel and training costs.

Longevity in the management ranks — all of the top managers have been with the company for 25 years or more — helps 3M carry out its ambitious agenda, says Kuhrmeyer, who has been with the company for 39 years. "We can do some of the things we do," he says, "because we trust each other completely." □

RYAN IS COMPUTERWORLD'S SENIOR WRITER, FEATURES.

Manufacturing

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**3M Co.** St. Paul, MN 86,600	30	26,540	$1,310	$469	42,200
2	**The Mead Corp.*** Dayton, OH 21,800	48	25,725	$216	$53	18,273
3	**Baxter International, Inc.** Deerfield, IL 60,000	50	25,645	$446	$200	25,000
4	**TRW, Inc.*** Cleveland, OH 74,300	64	25,315	$263	$85	40,607
5	**Amax, Inc.** New York, NY 20,000	73	25,055	$360	$30	10,000
6	**The Penn Central Corp.*** Cincinnati, OH 15,100	75	25,035	$174	$15	6,538
7	**Becton, Dickinson & Co.** Franklin Lakes, NJ 18,800	83	24,785	$169	$46	7,381
8	**Xerox Corp.** Stamford, CT 99,000	85	24,740	$704	$400	43,000
9	**Aluminum Co. of America*** Pittsburgh, PA 60,660	89	24,705	$945	$104	16,617
10	**Inland Steel Industries, Inc.** Chicago, IL 20,000	91	24,655	$241	$70	5,400
Medians for industry Top 10		74	25,045	$312	$78	17,445

Companies are ranked in industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company.

IS Helps 'Cat' Stay on its Feet

BY MICHAEL FITZGERALD

Heavy industry giant uses systems to keep its balance during tough times

In a decade that was tough on heavy industry, Caterpillar, Inc., known by many simply as Cat, held its position as the world's top maker of heavy equipment. The $11.1 billion company is No. 1 or No. 2 in each of its dozen or so markets, ranging from tractors to front-end loaders, pipe-layers and various engines. And the company has actually gained market share in its major lines of business.

With information systems playing a strong role in that kind of success record, it's no surprise that the Peoria, Ill., company ranks No. 1 in the *Computerworld Premier 100* industrial class and is one of only four industrials in the overall ranking.

Caterpillar's IS strategy is vital to maintaining its leadership position. "We make sure that the company always has a competitive advantage from the use and flow of information," says Dale Fieldcamp, director of computer IS at Caterpillar.

Fieldcamp, 62, has worked at Caterpillar for 40 years in departments ranging from parts distribution to finance and accounting. He has worked in IS for the past 10 years, six years as director. His broad background in the business helps give users "a feeling of confidence" that their interests are being served by IS.

His philosophy? "The users should always feel that it's their project, their objectives and their goals, and it's not an 'IS project,' " Fieldcamp says.

That approach squares with what Fieldcamp sees as a fundamental shift over the last few years in systems projects in general. "The process is now geared more toward the total business, where before it was geared more toward the task at hand," he says.

Fieldcamp credits Caterpillar's top executives with helping spread technology throughout the organization. "Management recognizes the importance of information technology. That's been a major factor in our success."

In this case, crediting management is more than simply good politics, Wall Street analysts say. Caterpillar goes into a project having done "much deeper soul-searching" than its competitors, says Karen Ubelhart, a first vice-president at Shearson Lehman Hutton, Inc.

Take, for example, the company's $2.3 billion, 5-year-old "Plant With A Future" project designed to revamp the 32 facilities that Caterpillar operates worldwide by 1992. "Companies are always upgrading their factory floors," Ubelhart says, "but Cat just sat down with a clean sheet of paper and, instead of doing an evolutionary change, is making a major change in the way they make their products."

Caterpillar is one of the most vertically integrated companies in the industry, which "puts a greater demand on [information] systems," says Tobias Levkovich, capital goods/machinery analyst at Smith Barney, Harris Upham & Co. One result, he says, is that "you've got to control your entire manufacturing process from steel producing to the end of the assembly line."

This puts added pressure on IS, which has to be involved in the new design criteria for equipment as well as design of the manufacturing floor.

The extreme vertical integration makes Caterpil-

Continued on page 60

Caterpillar, Inc.

Caterpillar, Inc. *keeps rolling along*

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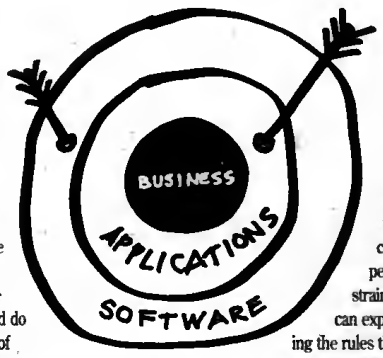

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Continued from page 58

lar a highly capital-intensive company, which means the huge investment in the Plant With A Future project is a genuine commitment to complete change.

"Caterpillar has been extremely centralized, which was a way of managing the demand that they have," says Jennifer Cole, industrial goods analyst at A.G. Edwards and Sons, Inc. Cole says she approves of Caterpillar's extensive and ongoing reorganization.

"I think they're doing the right things with the Plant With A Future program and the reorganization of the management structure," she says. "They have reorganized the manufacturing from centralized to decentralized functions. Each area will be profit centers, whereas each individual division didn't have a good sense of where money was coming from before."

What makes Caterpillar IS so effective?

- **$2.3 billion plant of the future project.**
- **Vision of seamless worldwide network.**
- **Emphasis on technological change.**
- **Extensive use of advanced telecommunications.**

Fieldcamp also sees it as another management challenge for IS:

"They're setting up profit centers; we have to get them all the information they need to run their businesses in a new way. We have to be sure we're developing those and making it available to them."

Fieldcamp says this extreme vertical integration, plus the effort to decentralize, pulls the IS department in different directions.

"We try to minimize the centralization and to keep it as distributed as is practical. But in a highly integrated operation like ours, we have to recognize that some core corporate items must be centralized," he says.

Thirteen of Caterpillar's 17 divisions are "profit centers" that sell directly to the public. The other four are internal service divisions. Fieldcamp's group is part of the Corporate Services Division, headed up by Vice-President Charles E. Rager. Other branches within the division include marketing support services and computer-integrated manufacturing. The company now has about 300 product lines (services not included), as opposed to approximately 150 lines a decade ago.

Caterpillar has plants in 10 countries, 217 dealers worldwide and 22 distribution sites in 10 countries. Systems in use range from Unix-based workstations in engineering to IBM machines on the corporate side and Digital Equipment Corp. systems on the shop floors.

With design engineers in Illinois, Japan, Belgium and Brazil working on the same products, for instance, Fieldcamp must find ways to allow these engineers to work together.

One way is through heavy emphasis on advanced telecommunications. Caterpillar bought a satellite four years ago with the goal of allowing its engineers to work on the same image simultaneously and see their colleagues' changes as they are made.

Fieldcamp estimates that this kind of seamless image sending is probably another three or four years away. In the meantime, the satellite has enabled Caterpillar to get service and marketing information to its dealers faster than ever before.

"We sell products throughout the world, and you need a communications network that will reach dealers regardless of how remote they are, and reach them in a timely fashion so they're up to date on equipment and how in service the equipment," Fieldcamp says.

It's all part of keeping Caterpillar moving. As Fieldcamp says, "business needs drive the use of technology." And at Cat, that means a big payload. □

FITZGERALD IS A COMPUTERWORLD MIDWEST BUREAU CORRESPONDENT.

Industrial

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Caterpillar, Inc.** Peoria, IL 60,409	35	26,405	$497	$300	25,000
2	**The Timken Co.*** Canton, OH 17,248	43	25,910	$55	$37	5,110
3	**The Pittston Co.*** Greenwich, CT 14,500	60	25,470	$4	$66	4,914
4	**Ingersoll-Rand Co.** Woodcliff Lake, NJ 31,623	61	25,400	$210	$80	18,000
5	**Dresser Industries, Inc.*** Dallas, TX 31,400	104	24,295	$170	$106	9,420
6	**Harnischfeger Industries, Inc.*** Milwaukee, WI 12,000	135	23,675	$71	$20	3,538
7	**Masco Industries, Inc.*** Taylor, MI 14,300	170	23,135	$57	$35	1,981
8	**Trinity Industries, Inc.*** Dallas, TX 9,560	194	22,835	$30	$13	362
9	**Paccar, Inc.*** Bellevue, WA 13,077	201	22,740	$242	$50	3,769
10	**Parker Hannifin Corp.** Cleveland, OH 31,000	212	22,620	$124	$49	8,600
Medians for industry Top 10		120	23,985	$98	$50	5,012

Companies are ranked by industry according to CW 100 Index. *Estimates are from *Computerworld* sources, not the company.

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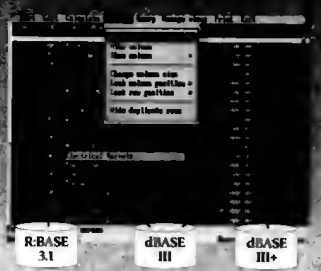

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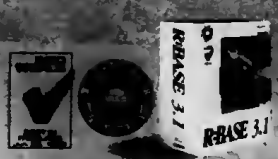

Tight Lips, Laptops and Supers Help Merck Shine

BY GLENN RIFKIN

Louis Psihoyos/Matrix

CEO Vagelos *heads up Merck's management council*

Information systems excellence might be one of the best-kept secrets about Merck & Co., a potent force in the tight-lipped drug industry and arguably the most highly regarded corporation in the U.S.

In 1986, Merck passed none other than IBM to finish atop *Fortune*'s list of America's most admired corporations and has held that spot ever since. It now adds another honor: most effective user of IS in the pharmaceuticals market.

You'd hardly know it. Albert Cinorre, Merck's vice-president of computer resources, refuses to discuss Merck's IS operations and has instructed his staff to do the same.

Although he won't talk to the press, Cinorre did acknowledge in an internal company publication that Merck considers itself a technology leader in the industry. In fact, without Merck's major commitment to computing, Cinorre added, "we'd probably be out of business."

Cinorre oversees an IS budget of $185 million and a staff of 1,000 IS professionals in Merck facilities around the world. According to information provided by Merck, the company has 11,000 personal computers and terminals and spends 50% of its IS budget on personnel costs such as salaries, training, benefits and travel.

The company, formerly a major Wang Laboratories, Inc. shop, has turned to IBM during the past three years. Most of its $110 million worth of equipment is from IBM, and according to a Merck spokeswoman, the new corporate headquarters in White House Station, N.J., will use state-of-the-art IBM systems. Merck plans to move in 1992.

The pharmaceuticals industry is intensely competitive and is thus secretive about product development. A successful new drug introduction is the result of years of exhaustive research, clinical trials, government approvals and marketing plans. Mevacor, for example, a critical cholesterol-reducing drug, took Merck 10 years to develop. Being first to market can mean hundreds of millions of dollars in revenue to a company. So it's little surprise that sharing tips on how to get that edge is verboten.

Merck also gets to market better than anyone else. According to *Fortune*, Merck has introduced a remarkable 10 major drugs since 1981, each accounting for at least $100 million in sales annually.

Computers play a critical role in drug development, particularly in the areas of molecular modeling and crystallography. Merck recently installed a high-end IBM 3090 with supercomputer speed in its Merck, Sharp & Dohme Research Lab.

Merck scientists were finding it difficult to get computer time on the old

system to model and analyze results of design and testing. The new system allows Merck scientists to run programs in seconds that once took 30 minutes or longer on older workstations.

Merck hopes the new system will make possible such research projects as designing molecules to adhere to receptors or binding sites in the body. Finding these molecules often means testing hundreds of compounds, using computer simulation to find the one that fits. Once the molecules are found, chemists can theoretically synthesize them and find new ways to combat cancer and other diseases.

Merck, Sharp & Dohme's sales force — the largest in the Merck empire — pioneered the use of portable PCs back in the mid-1980s and is now spreading laptop technology even further. By the end of 1991, all 2,700 sales representatives will be using laptops on customer calls.

By giving its 100 hospital sales representatives computers five years ago, Merck earned a reputation as a technology-driven company, and that image has spread. The company says PCs allow sales representatives to make on-the-spot projections and analyses that would previously have taken weeks. For example, a software program for Merck's injectible antibiotic Primaxin can make 24,000 comparisons of the microbiological spectrum of 28 antimicrobial agents so that physicians and prospective customers can see just how many diseases the drug can treat.

Merck is using laptops and conventional PCs in training and sales support across the entire corporation. Internally developed software programs are giving Merck a competitive advantage in every facet of sales, including plan routing, order tracking, customer profiles and imernal communications.

For the past several years, Merck has been investing heavily in robotics and intelligent vision systems to improve its quality control and manufacturing processes.

Merck has its own advanced technology group, which is at work on developing a low-cost secing machine. William Pater, senior director of IS management, oversees the group.

The firm has also targeted expert systems and voice recognition as critical technologies for use in its research-intensive environment. It installed its first voice recognition system in 1987 at its Hybridoma lab in West Point, Pa.

Merck's IS group did pioneering work in creating the pharmaceutical industry's first computer-controlled processing facilities. The company implemented an MRP II system at its West Point facility as well.

Merck's business strategy is steered by a management council headed by Presidem and Chief Executive Officer Roy Vagelos. The council, which meets monthly, is made up of 22 senior-level executives; each division is represented. Cinorre and his Computer Resources Group are part of a corporate division that oversees the activities of all other divisions. Cinorre himself reports to council member Stanley Fidelman, senior vice-president of engineering and technology. □

RIFKIN IS A COMPUTERWORLD FEATURES EDITOR.

What makes Merck IS so effective?

- Strong investment in IS personnel.
- Savvy use of IBM 3090 for drug development.
- Widespread use of portable PCs for sales force.
- Exploration of advanced technologies, including robotics, intelligent vision.

Pharmaceuticals

Industry rank	Company Location Total employees	Overall rank	Total score	1989 profits (millions)	Estimated IS budget (millions)	Total PCs and terminals
1	**Merck & Co.** Rahway, NJ 34,000	38	26,310	$1,500	$185	11,000
2	**Abbott Laboratories** Abbott Park, IL 43,000	79	24,975	$860	$145	15,000
3	**Eli Lilly and Co.*** Indianapolis, IN 28,200	92	24,505	$940	$39	24,995
4	**Central Soya Co.** Ft. Wayne, IN 3,474	113	24,005	$15	$23	741
5	**Johnson & Johnson** New Brunswick, NJ 81,300	132	23,705	$1,082	$212	14,958
6	**Whitman Corp.** Chicago, IL 25,000	153	23,425	$372	$40	2,400
7	**Pfizer, Inc.** New York, NY 40,000	159	23,370	$681	$175	11,000
8	**Warner-Lambert Co.*** Morris Plains, NJ 33,000	167	23,190	$413	$41	6,488
9	**Schering-Plough Corp.*** Madison, NJ 21,300	188	22,915	$471	$38	5,162
10	**Coca-Cola Enterprises, Inc.*** Atlanta, GA 20,000	190	22,895	$1,724	$41	3,885
	Medians for industry Top 10	143	23,565	$771	$41	8,744

Companies are ranked by industry according to CW 100 Index. *Estimates are from Computerworld sources, not the company.

THE PREMIER 100

COMPANY, RANK

Ambase Corp., **80**
AMR Corp., **4**
AT&T, **74**
Abbott Laboratories, **79**
Aetna Life & Casualty Co., **99**
Air Products & Chemicals, Inc., **25**
Allied-Signal, Inc., **24**
Aluminum Co. of America, **89**
Amax, Inc., **73**
American Express Co., **26**
Ameritech Applied Technologies, **23**
Atlantic Richfield Co., **31**
Banc One Corp., **9**
Bankamerica Corp., **40**
Bankers Trust New York Corp., **3**
Baxter International, Inc., **50**
Becton, Dickinson & Co., **83**
Bell Atlantic Corp., **22**
The Boeing Co., **49**
CSX Corp., **55**
Carter Hawley Hale Stores, Inc., **87**
Caterpillar, Inc., **35**
Centerior Energy Corp., **47**
Chicago & North Western Trans. **14**
Colgate-Palmolive Co., **88**
Contel Corp., **39**
Corestates Financial Corp., **19**
The Dow Chemical Co., **20**
Duke Power Co., **82**
The Dun & Bradstreet Corp., **11**
Eli Lilly and Co., **92**
Enron Corp., **96**
FMC Corp., **2**
Federal Express Corp., **28**
Freeport McMoran, Inc., **70**
GTE Corp., **21**
Gencorp, Inc., **10**
General Dynamics Corp., **6**
General RE Corp., **44**
Gillette Co., **13**
The B.F. Goodrich Co., **46**
Grumman Corp., **41**
Ingersoll-Rand Co., **61**
Inland Steel Industries, Inc., **91**
J.C. Penney Co., **95**
J.P. Morgan & Co., **76**
Jostens, Inc., **100**
Lockheed Corp., **77**
Louisiana Land & Exploration Co., **86**
MCI Communications Corp., **1**
Martin Marietta Corp., **16**
Massachussetts Mutual Life Ins., **53**
McDonnell Douglas Corp., **65**
McGraw-Hill, Inc., **72**
The Mead Corp., **48**
Merck & Co., **38**
Merrill Lynch & Co., **93**
Metropolitan Life Ins. Co., **63**
Mobil Corp., **68**
Monsanto Co., **37**
Mutual Benefit Life Ins. Co., **84**
The Mutual Life Ins. Co., **94**
National City Corp., **81**
New York Life Ins. Co., **54**
Northeast Utilities, **45**
Northrop Corp., **51**
Northwestern Mutual Life Ins., **98**
Norwest Corp., **8**
Oryx Energy Co., **32**
Pacific Mutual Life Ins. Co., **34**
Paine Webber, Inc., **7**
The Penn Central Corp., **75**
Phillips Petroleum Co., **33**
The Pittston Co., **60**
Polaroid Corp., **42**
Primerica Corp., **58**
The Prudential Ins. Co. of America, **57**
Quantum Chemical Corp., **67**
Rockwell International Corp., **69**
Rohm & Haas Co., **52**
Salomon, Inc., **36**
Sears, Roebuck and Co., **12**
Security Pacific Corp., **17**
Shawmut National Corp., **97**
Signet Banking Corp., **15**
Southwestern Bell Corp., **29**
Sun Co., **78**
TRW, Inc., **64**
Textron, Inc., **66**
The Timken Co., **43**
The Travelers Corp., **71**
3M Co., **30**
US West, **27**
Union Carbide Corp., **62**
Union Texas Petroleum Holdings **5**
United Technologies Corp., **59**
United Telecommunications, Inc., **18**
Valhi, Inc., **90**
Wells Fargo & Co., **56**
Xerox Corp., **85**

HOW TO EVALUATE YOUR COMPANY

Companies that wish to compare their use of information systems with the *Computerworld Premier 100* can request a worksheet to evaluate their ranking. During the past two years, companies have found the worksheet to be a useful measure of their industry standing.

Actual *Premier 100* rankings are based on a system that considers each firm's score in relation to the figures for all companies surveyed (see methodology page 17). For this reason, the worksheet calculations will not represent exact scores. However, ranges provided in the worksheet will allow companies to approximate their total scores.

To obtain a worksheet, contact Michael L. Sullivan-Trainor, Senior Editor, *Computerworld*, 375 Cochituate Road, Framingham, Mass. 01701. Telephone: (800) 343-6474 or (508) 879-0700, Ext. 229.

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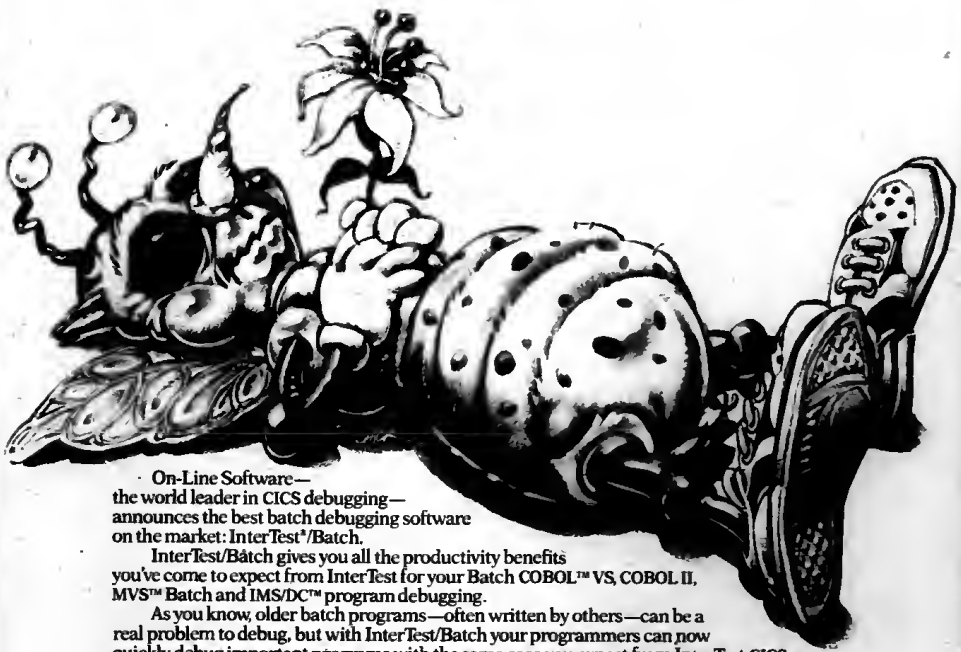

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